THE DENTAL PRACTITIONER

AND DENTAL RECORD

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THE DENTAL PRACTITIONER

AND DENTAL RECORD

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THE DENTAL PRACTITIONER AND DENTAL RECORD

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EDITORIAL

TOPICAL FLUORIDES

EIGHTEEN years ago Bibby showed that the four topical applications of sodium fluoride to the teeth of a child reduced the incidence of dental decay by 46 per cent in the first year, and by 33 per cent in the second. Since that time other research teams in different parts of the world have substantiated these findings.

What happened as a result of this startling advance in the battle against dental disease?

Initially, many dentists sought to provide this treatment for their young patients; but the early enthusiasm did not last long. Prophylactic cleaning of the teeth, the drying off of each segment, the application of a 2 per cent sodium fluoride solution, and then leaving it for two or three minutes, was a laborious and time-consuming process. Keeping the young patient quiet and co-operative required the patience of Job. A fair fee for the operator was difficult to determine, since no detectable result is visible: one based on time and difficulty seemed out of proportion to both the dentist and the patient. A percentage reduction in the incidence of decay can only be seen, anyway, in strictly controlled research projects, not in the ordinary dental practice. And, finally, the publicity given to the fluoridation of water-supplies overshadowed the benefits of topical application. So nearly everyone conveniently forgot about it.

Happily, however, research into fluoride therapy has continued. Clinical tests repeatedly demonstrate that a 2 per cent solution of sodium fluoride applied four times in a fortnight is effective in reducing decay, provided the teeth are carefully cleaned beforehand.

In Sweden, Berggren is having favourable results when children brush their teeth with a 0·5 per cent fluoride solution at the time of their six-monthly prophylaxis. In Britain, the addition of a fluoride to chewing gum is in an experimental stage, and gives promise of a more pleasant form of application. In the United States it has now been clearly shown that a stannous ion in a fluoride compound has a greater anticariogenic effect on the teeth than sodium fluoride. Furthermore, it is still more effective on the teeth which have developed in the presence of fluorides. A single application of an 8 per cent solution of stannous fluoride each year appears to be significantly more effective than the earlier, and more tedious, sodium fluoride technique.

This simpler, and less time-consuming, method should become more popular with the dental profession.

The profession must remember that it is dedicated not only to the cure of dental disease and the repair of damaged teeth, but also to the prevention of dental decay. Continued research may find an even more potent compound than stannous fluoride for topical fluoride therapy. Until that time comes, let us use to the full the most powerful resources currently available.

GALAGAN, MUHLER, and BREEDEVOLD (1959), "Topical Fluorides—Symposium", *J. Dent. Child.*, **26**, 164.

A HEAD-REST FOR ORAL SURGERY

By IAN A. FINDLAY, F.D.S. R.C.S.
The Queen's University of Belfast

INTRODUCTION

RESTS and clamps have been developed for each of the specialities operating on the head of the supine patient, i.e., neurological, oto-rhinolaryngological, ophthalmic, radiological, and dental.

The simplest forms of head-rest suitable for oral surgery are the hourglass sandbag, the rubber ring, and the Ruben's operating pillow. A rest designed for conservative dental treatment on bedridden patients was recorded by Hutts (1952). A radiological clamp, the Graham Hodgeson, has been used with limited success in oral procedures. A number of other rests and clamps have been designed, for example, the Negus, the Haslingers, and the Stallards, but their application to dentistry is restricted (Down Bros. & Meyer & Phelps Ltd.).

There is, as yet, no head-rest or clamp available for use on the supine patient which fulfils the requirements of oral surgery.

REQUIREMENTS FOR A HEAD-REST OR CLAMP

There are two objectives which would appear to be basic in the design of a head-rest or clamp for oral surgery: (1) Immobilization of the head and neck; (2) Extension of the head and neck.

1. Immobilization of the Head and Neck.—

a. The flexion and rotation of the head may cause damage to pharyngeal or laryngeal tissues by friction from the endotracheal anæsthetic tube. This factor may have some bearing on post-operative sore throats.

b. Oral surgery may involve measures which may inadvertently rotate the head; this factor becomes particularly important in procedures which require a fixed operative position, e.g., the recovery of a fractured needle.

c. The twisting of the head and neck in relation to the trunk and shoulders may cause trauma to the cervical vertebra.

2. Extension of the Head and Neck.—

a. Kinking of the endotracheal tube and partial or complete obstruction of the airway due to excessive flexion of the head may cause complications in anæsthesia (Mackintosh, Mushin, and Epstein, 1958).

b. The possibility of cervical disk lesions demands that the utmost care should be taken to avoid damage to the vertebral column. The maintenance of the head and neck in the position of extension fulfils this aim.

c. The "chin up" position allows maximum opening of the mouth without displacement of the laryngeal tissues.

In addition to the objectives of immobilization and extension, a head-rest or clamp must be, on application, painless to the "conscious" subject. This factor is important as compression trauma on the scalp is not easily detectable.

Further, the appliance must be robust, cheap, and simple to operate. It must, if possible, necessitate no extensive alteration to existing apparatus and must be easy to clean and maintain. Also, it must not interfere with the movement of the surgeon around the operating table.

THE ANATOMICAL PROBLEM

The "egg-shaped" calvaria forms the part of the skull to which immobilization can be applied. To avoid extrusion of the skull by the clamping force, the maximum use must be made of contour and undercut. Three main lines exist for the application of force: (1) Sagittally—relating the frontal, vertex, or lamboid regions to the region between the superior and inferior nuchal lines on the occipital bone; (2) Coronally—relating the frontal or temporal regions to the parietal or occipital regions; and (3) A combination of sagittal and coronal application. The force exerted along the lines of application may be: (1) An active clamping mechanism; (2) A passive rest or wedge system; or (3) A combination of active and passive design.

Variation in head size is the next important consideration. Flemming (1933) in a survey of male and female Welsh children showed that

at 18 years of age the variation in head length was 39 mm. with a maximum length of 214 mm. and a minimum length of 175 mm. The variation in head breadth was 28 mm. with a maximum of 165 mm. and a minimum of 137 mm. These measurements are very similar to the variations obtained by Young (1916) on dried adult Scottish skulls.

Variations in stature and neck length must also be considered. Scalp movement and the variations in the quantity of the hair further complicate the problem of immobilization.

RESULTS OF PROTOTYPES

In the course of this work 9 new designs of head-rest were selected for clinical trial. These appliances represented a transition from a purely active clamping mechanism to a simple passive head-rest. From these prototypes the following points were observed:

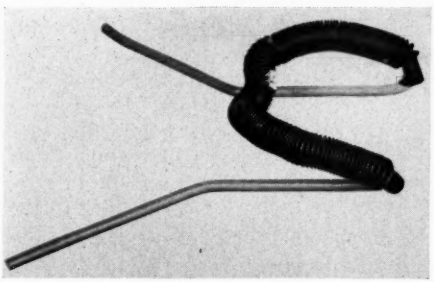

Fig. 1.—The new head-rest.

1. Both sagittal and coronal application of force were successful. However, in the final passive design a combination of these approaches was made.

2. With a clamping mechanism fixed to the operating table there was a danger of the footboard slipping in the "head up" position and the patient being hung by his own weight.

The principal reason for the use of a clamp fixed to the table was to maintain the head and neck steady in relation to the trunk. It was found that this could be achieved much more simply by providing a flange which extended under the shoulders and maintained the head in position by means of the patient's own weight.

3. Mechanically exact apparatus proved to be unnecessary for immobilization and a minimum of working parts was preferable for hygiene and economy.

4. The use of active pressure for immobilization was of no advantage. The "dead" weight of the skull, combined with suitable wedges, provided sufficient pressure for immobilization.

5. Both solid rubber head-rests and rubber-covered steel frame head-rests were constructed. It was found that the functional rubber-covered steel frame was preferable, as it contacted only a small area of the skull and consequently allowed for great variation in head size, and in particular the inconsistency in bulk of women's hair.

Fig. 2.—The head-rest in position.

6. Rotation of the skull laterally in passive head-rests could only be satisfactorily executed in appliances without temporal extensions.

A NEW DESIGN OF HEAD-REST

The basic form of this appliance is constructed out of a single piece of $\frac{1}{4}$ in. diameter steel rod 4 ft. 4 in. in length, and bent into the shape of a "U". Its principle is best demonstrated by the wedge effect achieved when attempting to pass a ring of a certain diameter over a ball of slightly greater diameter. In this design the ring is incomplete, and to conform to skull contour, its sides are flattened to form the "U" shape.

The base of the "U" lies horizontally, and is transversely concave, contacting the posterior cervical region at approximately the position of the fourth cervical vertebra. The centre point of this portion lies 3 in. above the operating table. The head rotates over the transverse bar and wedges itself between 2 horizontal portions of the "U" in the region of the mastoid processes. From the mastoid area the "U" arms, which are 6 in. (150 mm.) apart at this point, are angled downwards at 30° for a distance of 5 in. along a line drawn between the mastoid processes and the mid-point of the sagittal suture of the parietal bone. The arms are slightly divergent, and lose contact with the skull in the region of the superficial temporal line. The "U" is then bent sharply back upon itself to form the base with its neck and shoulder prolongations (*Fig.* 1).

Fig. 3.—Before application of head-rest. Note kinking of endotracheal tube.

Fig. 4.—After application of head-rest. Note almost complete removal of kinks.

The steel frame in contact with the head is covered with corrugated rubber anæsthetic hose, which is further internally padded in the mastoid regions. The corrugations in the hose provide a firm cushion, and yet are adaptive to variations in head form (*Fig.* 2).

Table I.—Measurements taken from Radiographs of the Endotracheal Tube in 18 Patients with and without the Head-rest

No.	Sex	Diameter of Tube at Lower Border of 2nd Cervical Vertebra in mm.	"Kink" Diameter		Improvement in mm.	Amount of Kink still Present in mm.	Angle of Floor of Nose	
			Without Rest in mm.	With Rest in mm.			Without Rest	With Rest
1	M	8·5	7·0	7·5	0·5	1·0	80°	65°
2	M	10·0	9·0	10·0	1·0	0·0	75°	55°
3	M	8·0	2·0	3·0	1·0	5·0	90°	65°
4	F	8·0	5·0	8·0	3·0	0·0	75°	60°
5	F	8·0	7·0	8·0	1·0	0·0	65°	60°
6	F	8·0	1·5	8·0	6·5	0·0	90°	70°
7	M	7·5	5·5	6·5	1·0	1·0	80°	65°
8	M	8·0	2·0	6·5	4·5	1·5	85°	60°
9	M	8·0	7·0	8·0	1·0	0·0	95°	65°
10	F	8·5	3·0	7·5	4·5	1·0	85°	60°
11	M	8·5	5·0	7·0	2·0	1·5	85°	65°
12	F	8·0	6·0	7·0	1·0	1·0	90°	65°
13	M	8·5	3·5	7·0	3·5	1·5	90°	65°
14	M	8·5	7·5	8·0	0·5	0·5	70°	60°
15	F	8·0	6·0	7·0	1·0	1·0	70°	60°
16	F	8·0	2·0	7·0	5·0	1·0	95°	60°
17	M	9·5	7·0	7·5	0·5	2·0	100°	65°
18	M	10·0	8·0	9·0	1·0	1·0	70°	60°

Immobilization of the Head and Neck.—Pre- and post-operative measurements were taken on 12 consecutive supine patients undergoing routine oral surgery with endotracheal anæsthesia. The measurements were recorded bilaterally from a skin pencil mark on the nasion to a fixed point on the base arms of the head-rest. The sterile towels were laid below the appliance before measuring, to ensure that only displacement arising from the surgical procedure would be recorded. It was found that rotation of the head laterally was in 11 cases no more than 5 mm., but in one case amounted to 15 mm.

Extension of the Head and Neck.—Lateral radiographs were taken on 18 consecutive, supine, anæsthetized patients—prior to oral surgery, with and without the head-rest. A 3 sec. exposure at 64 kV. and an anode-film distance of 34 in. was used. The centre point was in the region of the sigmoid notch of the ascending ramus of the mandible. Nasal intubation was present in all cases, and radiographically the rubber endotracheal tube was easily differentiated from the surrounding soft tissue (*Figs.* 3, 4). Three measurements were made on each radiograph: (1) The diameter of the endotracheal tube in the region of the constriction, if any; (2) The diameter of the tube opposite the lower border of the second cervical vertebra; (3) The angle formed by the floor of the nose to the horizontal, i.e., the operating table.

A pharyngeal saline pack was inserted prior to radiographic examination and any "extension" of the head and neck so produced was relieved by gently positioning the head in its "normal" supine relationship, with all tension removed from the anæsthetic connexions.

The results of this investigation are presented in *Table I*, and the following conclusions were made:

1. The maximum extension of the head and neck occurs at the atlanto-occipital and atlanto-axial joints.

2. An increase in the radiographic diameter of the endotracheal tube as it passes through the anterior portion of the nose occurs in all cases in the present series. This lateral compression occurs in the area of the inferior turbinate bone.

3. A reduction in the radiographic diameter of the endotracheal tube or "kinking" occurs in the region of the posterior border of the palatine bones. Eight cases (44·4 per cent) showed a reduction in the diameter of the airway, which varied from 3 to 6·5 mm. The remaining 10 cases showed a reduction of airway from 1 to 2·5 mm.—all measurements being made to the nearest half millimetre. On the application of the head-rest, 6 cases (33·3 per cent) showed an improvement in the diameter of the airway which varied from 3 to 6·5 mm. The remaining 12 cases showed an improvement which varied from 0·5 to 2 mm.

4. Extension of the head in the rest tends to increase the airway by making the angle of the tube in the region of the posterior edge of the palatine bones more oblique. The degree of extension achieved, measured to the nearest 5°, varies in 16 cases between 25° and 30° to the vertical; in one case (No. 2) it was only 20°. In general, the nearer the nasal floor to the vertical, the greater the chance of kinking.

5. Under the influence of a relaxant anæsthesia the extension of the head to the 60°–65° position produces a natural opening of the mouth. This opening produces the maximum extension consistent with the horizontal position of operating, and further extension would necessitate the adoption of the "tonsil" position.

Lateral Angulation of the Head.—In the majority of oral cases the vertical position of the head is used, as overhead lighting limits the amount of lateral movement. However, with this rest the head can be rotated to the 45° angle so as to bring the ear on the side of rotation to lie below one of the lateral arms. The zygomatic arch and the temporal area now come to lie against this arm, and the head is thus firmly positioned.

Tissue Reaction to the Head-rest.—The head-rest is not painful in any way on the conscious subject. Careful inspection of the necks and backs of 70 patients, including 3 hæmophiliacs, immediately after oral surgical procedures, which varied in duration from

10–90 min. has shown pressure markings from the rest to be of the mildest character.

No adverse post-operative symptoms or signs have been attributable to this rest during its 8 months' clinical trial.

The examination of these findings in relation to the incidence of post-operative sore throats is in progress.

Adaptation to Theatre Technique.—The head-rest required no alteration to existing apparatus. Towelling with rectangles 2 ft. × 3 ft. 6 in. was easily and satisfactorily achieved in the traditional "two towel" oral surgical method. The appliance was found to be easily washed and cleaned.

SUMMARY

1. A simple passive head-rest is presented, which is suitable for oral surgery and fulfils the requirements of immobilization and extension of the head and neck.

2. A radiographic examination of the head position with and without the head-rest showed that:—

a. Kinking of the rubber nasal endotracheal tube occurred in the area of the posterior border of the palatine bones in all of the 18 consecutive anæsthetized patients examined. The diameter of the tube in the region of the kink was reduced by 3–6·5 mm. in 44·4 per cent of cases, and this obstruction was relieved by the same amount on application of the head-rest in 33·3 per cent of cases, and relieved in some measure in all the remaining cases.

b. On application of this head-rest the floor of the nose lay approximately 65° to the vertical. This degree of extension provided the ideal anæsthetic and operative position.

Acknowledgements.—Thanks are due to Dr. James Scott and Professor P. J. Stoy for advice in the preparation of this paper; to Mr. A. S. McMahon of the Maintenance Department, who constructed the steel frame for the final head-rest, to Miss I. Dickson for the radiographic examination, to Mr. R. Woods for the photographs, to Professor A. M. Horsnell for stimulating encouragement, and finally, to Mr. T. G. Ward of East Grinstead, who initiated this work.

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Facial Sinuses of Dental Origin

These are not very common. It is true to say that the variety of positions in which they can, and do, occur may not connect in one's mind with the possibility of a dental cause.

When differential diagnosis is to be considered for discharging facial or cervical sinuses, the following must be borne in mind in addition to infected teeth: carbuncle, boil, infected cyst, actinomycosis, tuberculosis, foreign bodies, branchial fistula, thyroglossal fistula, parotid fistula, and pre-auricular sinus. Each, of course, has its own particular peculiarities.

While taking radiographs it cannot be overstressed that views taken from varying angles are frequently essential. A sinus with an external discharge, especially on the face, is not easily associated with teeth. The track that the pus will follow does not necessarily take a direct route through the nearest skin surface. The track will be determined by the the density of the tissues, their attachment, planes of the separation, and the arrangement of the muscle groups.

Radiographs can be dangerously misleading at times and they should be taken from different angles of view and different views taken only from slightly varying angles. Treatment usually consists of curettage of the sinus track, extraction of the tooth or/and the removal of the root along with removal of any infected granulation associated with either.—Hamilton, Alan (1958), *Brit. J. Surg.*, **46**, 28.

THE CONSTANCY OF THE REST POSITION OF THE MANDIBLE

By **D. C. BERRY**, M.D.S., Ph.D.
University of Bristol Dental School

It is not easy to define the term "rest position" without becoming involved in physiological terminology. If the *Glossary of Prosthodontic Terms* (Academy of Denture Prosthetics) is consulted, it will be found that "rest position" is not recognized as a correct term, unless preceded by the word "physiological". The *Glossary* gives two alternative definitions, one mentioning that the "condyles are in a neutral unstrained position". Both definitions refer to the state of "tonic equilibrium" of the jaw muscles. That two alternative definitions of the "physiological rest position" are given suggests that difficulties arose when the glossary was formulated. Further, the term itself has been criticized because it suggests that the rest position of the mandible is maintained by "the reciprocal activity of groups of muscles at a physiological resting tonus", and also that the same muscles are always involved, regardless of the position of the head (Ballard, 1955). There is no doubt that these criticisms are valid. With increasing knowledge of the manner in which the mandible is balanced in the so-called rest position, the definition of this position must be modified accordingly. But whether it is necessary to alter the term "rest position" itself is a matter of opinion. In a recent paper, Brill, Lammie, Osborne, and Perry (1959) suggest that there are two basic mandibular positions in the sagittal plane, and three in the horizontal plane. These positions are variously determined by the teeth, the muscles, and the lateral ligaments of the temporomandibular joints, and a new nomenclature covering these positions is suggested. However, they prefer that the term "rest position" should be retained for that position of the mandible in the vertical plane which is governed by muscle tone. It is clearly desirable that those engaged on investigations of the factors responsible for the maintenance of this position should define their thoughts with the greatest possible exactness. If it is necessary to alter established terminology to achieve this, a new vocabulary arises, which is not intelligible to the uninitiated. It is inevitable that any new term or title suffers some delay before it is adopted, but this delay may be very great if the title is a longer and more cumbersome phrase than that which it is designed to replace.

Those of us who have been brought up on the term "rest position" may therefore be reluctant to abandon this name. It is not without merit, for, although not explicit, it is explanatory. It is short, and comes easily off the tongue. It does not give rise to confusion if used intelligently, and will probably still be just as applicable whatever is discovered concerning the factors responsible for controlling this position. Therefore, in spite of the recent and most valuable work which has been published in this JOURNAL (Ballard, 1955, 1957), no apology is offered for the title of this article. But this recent work has important contributions to make to the prosthetic side of dentistry.

The procedure known academically as "registering the height of the vertical dimension and the horizontal relationship of the jaws", or more commonly "taking the bite", is no more scientific or precise to-day than a hundred years ago. The wire-profile, the Dakometer, the Bimeter, pre-extraction records, and various other mechanical devices have come and largely gone. Presumably they failed because the slight increase in accuracy which they were designed to provide was not worth the trouble their use entailed. Certainly no method yet devised for use in the average dental surgery provides the right answer every time. Yet more dentures fail because the bite is wrong than from any other cause. Whatever methods are employed to register the bite, the final position selected depends largely on the operator's opinion on the degree of relaxation the patient has achieved,

combined with or modified by a facial expression on the patient which is considered to be "about right". Such a decision, which may be further modified if the patient wishes to age more gracefully, can be no more than the exercise of intelligent guesswork.

It is therefore pertinent to reconsider what we assume to be established factors about the rest position, whether the natural teeth have been lost or not.

1. When the mandible is in the rest position, the natural teeth of the normal patient are slightly apart. This separation of the teeth, sometimes referred to as the free-way space, or inter-occlusal clearance, amounts to 2–3 mm. in most people. If this free-way space is not incorporated in the construction of full dentures, they will probably not be satisfactory. The variation in size of this space between different patients has been investigated in several ways and it appears that it may have a wide range. We are therefore not justified in accepting that a free-way space of 2–3 mm. will suit all our full denture patients, nor can we use this measurement as a guide to assist in the determination of the rest position of the mandible *in every case.*

If, as Ballard (1955) suggests, the central nervous system controls the maintenance of the rest position, it must also control the size of the free-way space. It is therefore not unlikely that the free-way space (and the rest position) will alter if the body as a whole is exposed to extreme stress, either physical or emotional. This is a purely theoretical supposition, but certainly patients who possess their natural teeth can be found in whom the presence of a free-way space cannot be demonstrated. Has the free-way space been temporarily eliminated by stress? Or is it possible that persons exist in whom the free-way space is congenitally absent? Certainly one's own clinical experience leads one to believe that if a free-way space can be provided for these patients, even though such heroic measures as total extractions may be necessary, they are happier. So much so that they may comment in such phrases as, "My *face* has never felt so comfortable". There also appears to be some relation between the presence of periodontal disease and the absence of the free-way space. As yet this relation is no more than suggested. Clinically, it can be demonstrated. But the difficulties associated with the assessment or measurement of the free-way space are considerable, and much further work is necessary before any definite claim can be made. It might well be agreed that in such cases the periodontal disease is essentially traumatic, but without a free-way space the occlusal loading must inevitably be excessive.

2. At one time there was general agreement amongst teachers of prosthetics that the rest position of the mandible remained constant throughout adult life. It persisted after the loss of the natural teeth, and could be regarded as fixed and unalterable. Orthodontists have investigated this constancy, and in general, agree that it is present. Professor Ballard (1955), suggesting hypotheses related to orofacial behaviour, expresses the position thus: "The mandible has a postural relationship to the maxilla which is endogenously determined, mature at birth, and probably remains stable throughout life."

This is extremely difficult to prove. Not only do we lack the necessary apparatus to determine the rest position, but we would also require a series of records over many years. Electromyography combined with clinical observation is at present our most precise tool, and may eventually provide the necessary evidence. Until this happens, our own clinical experience must be a somewhat unreliable guide. In this connexion it would be of interest to compare the opinions of those who have tried to use pre-extraction records as a guide to the rest position when making full dentures. My own experience of pre-extraction records, which is very small, suggests that there is often an alteration in the rest position if some months elapse between extractions and the provision of dentures. It may be that the patient becomes habituated to an abnormal chewing pattern after the loss of teeth, and this is reflected in the altered rest position. In other words, a reflex adaptation to a structural change is imposed on an endogenous pattern. If this is so, it would be expected that when dentures of the correct

vertical dimension as indicated by the pre-extraction records are inserted, the acquired reflex habits would no longer be necessary and would disappear, allowing the rest position to be re-established at its former level. This did not appear to happen in the cases observed, the patients merely complaining of symptoms typical of an "open bite". This is contrary to the findings of Thompson and Brodie (1942). Using a Broadbent-Bolton cephalometer, combined with radiography, to obtain pre- and post-extraction records of the rest position of the mandible, they found that the loss of the natural teeth did not cause any change in this position. Perhaps the explanation for this apparent contradiction of results lies in the length of the period between extractions and the fitting of dentures.

Attention has long been drawn by orthodontists to the importance of the acquired "bite of accommodation". Such a displacement of the bite is usually considered to refer to mandibular deviations in the horizontal plane. It is certainly a relatively common phenomenon, associated with overclosure among patients who have worn the same full dentures for many years. If provision can be made for the patient to return to, and use, a more normal centric jaw relationship, these acquired eccentric biting positions are abandoned. A similar phenomenon may sometimes be seen when the bite-displacement is not horizontal but vertical. If a patient is provided with full dentures in which the vertical dimension is excessive, and the patient exercises great tolerance and perseverance, he or she may succeed in wearing these dentures. There is continual discomfort, but the patient, told by sympathetic friends that this is inseparable from full dentures, continues the struggle. In time, accelerated resorption of the alveolar ridges may reduce the excessive vertical dimension of the dentures, but this does not always occur as rapidly as the patient acquires the habit of reducing the force of the biting movements. No free-way space exists, and the rest position of the mandible must necessarily be the occluding position of the dentures, when these are in the mouth. If, after many months of discomfort, the patient is seen again and the excessive vertical dimension noted, the decision may be made that new dentures, with a lesser vertical dimension, are necessary. These are made, and when inserted, a free-way space is present. The patient is delighted, and free from discomfort, but, not uncommonly, returns after an interval of some weeks with all the signs and symptoms of an open bite again. A further reduction in the vertical dimension is made sufficient to restore the lost free-way space. This may be successful, but there may yet be another recurrence of the open bite symptoms, necessitating further closure of the bite. To the clinical observer it appears that the rest position is changing throughout these cycles. A possible explanation is that the patient became habituated to the grossly excessive vertical dimension on the original dentures. When new dentures were made, the correct assessment of the rest position was not possible, for this position of the mandible had been modified or obscured by the acquired "open bite". However, this habituation began to disappear and as it did so the factors controlling the maintenance of the correct mandibular rest position became operative again, thus eliminating the free-way space on the new dentures and producing symptoms of "open bite" once more. It would seem that some weeks or even months are necessary for an acquired "open bite" habit to be lost. Unless this is considered, several sets of full dentures may be required, each of a successively smaller and smaller vertical dimension. Such cases, which are fortunately not common, point to the stability of the rest position, but cannot be said to support the theory that it is truly constant. When excessive alterations to the vertical dimensions are made by prosthetic treatment, small changes in the true rest position may pass unnoticed. A second hypothesis which has been put forward by Ballard (1955) is that "there is a repertoire of patterns of activity of the muscles of mastication, likewise endogenous, used for mastication, speech, etc." Observation of the age changes which occur in the face as a whole, particularly in persons past middle age, suggests that this repertoire of patterns of activity is modified by age. The soft tissues

become lax or shrunken; subcutaneous fat is redistributed; lips tend to lose their competence. If the nervous patterns of activity remain, the actual movements of the tissues alter because the tissues themselves change. Bone resorption, particularly in the anterior part of the mandible, may cause an apparent migration of muscle origins or insertions, as has been pointed out by Lammie (1956). Although the central nervous system may still exercise control of the patterns of activity, the observed results are not the same in old age as in the young adult. Age changes, as opposed to growth changes, are even more difficult to measure. There is no reason to suppose that ageing is a slow continuous process, commencing soon after maturity has been achieved. It may well resemble growth changes, which take place at irregular intervals at different sites in the body, and at different rates. But to assess the cause of a postural change as being solely due to ageing is impossible, for with increasing age comes pathological change, particularly in skin and joints. Again, one's own clinical experience suggests that in old age the rest position changes: the vertical dimension is reduced. Without careful records, obtained by some precise method, the rate of change cannot be stated. In most people it appears to be a gradual process, but occasionally it takes place rapidly. A patient who has been wearing full dentures with comfort and satisfaction for a period of 2 or 3 years may suddenly suffer from symptoms of "open bite"—soreness and complaints of "not enough room in my mouth". These symptoms may arise over a period as short as 2–3 weeks. Complete relief is obtained if new dentures are made to a reduced vertical dimension. Once again it is impossible to be sure of the cause of the altered rest position. It may be a response to stress; it may be an age change which is normal and peculiar to the individual. It is fortunate that such cases are not common.

SUMMARY

Our present knowledge of the constancy of the rest position is clearly inadequate, particularly in adults and the aged. Until more is known, we may achieve better results in prosthetic treatment by concentrating on the provision of an adequate free-way space rather than on the correct assessment of the rest position. It is unfortunate that, whichever course we decide to take, the only method which is readily available is the use of our own clinical judgement, which is, of necessity, based on experience.

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LETTER TO THE EDITOR

January 9, 1960

Dear Sir,

Mr. D. F. Glass's letter of October 26, 1959, tends to suggest that he is of the non-polishing school, and yet I know him to be such a good practitioner, that I am surprised he should write in this vein.

In restoring a tooth, I believe that one should attempt to emulate Nature in producing a surface which is as dense and highly polished as is enamel.

In this way the tooth is easier to clean and hence the danger of recurrent caries is reduced.

He might as well ask, Why do we bother to put a glaze on china? or, Why do we polish our furniture? It is a very sad reflection on present-day conservative dentistry to observe so few practitioners turning out well-finished fillings. In a recent investigation carried out on children from all walks of life, my figures showed that not more than 2 per cent of practitioners were finishing their fillings as they were taught to finish them in Dental School.

There is, of course, only one solution to this problem and that is more competition in the field of dentistry.

On a recent visit to the United States, I questioned several practitioners on the meticulous care with which they finished their fillings, and in each case I was informed that if this care in polishing their restorations was not taken, the patient would never return.

What a lesson for Britain!

Yours faithfully,

JOHN C. RITCHIE.

14 *South Street*,
Romford,
Essex.

NICOLAS DUBOIS DE CHÉMANT

A CONTRIBUTION TO DENTAL HISTORY

By J. MENZIES CAMPBELL,
D.D.S. (Tor.), Hon. F.D.S. R.C.S. (Eng.), F.D.S. R.C.S. (Edin.), F.R.S.E.
Honorary Member: American Academy of the History of Dentistry, and La Société Française de l'Histoire de l'Art Dentaire

NICOLAS DUBOIS DE CHÉMANT, who was born in or around 1753, can certainly be included among the flamboyant personalities of the late eighteenth century in Great Britain.

He played a notable role in advancing the art and practice of dental prosthesis by introducing the first mineral-paste denture: teeth, gums, and base baked in one piece.

It has been universally "accepted" by dental historians that Duchâteau (an apothecary of St. Germain-en-Laie) was straightway incensed with de Chémant for having appropriated his discovery and secured a *brevet d'invention* from Louis XVI.

Nevertheless, in this connexion, a highly significant letter, dated Oct. 20, 1789, from Duchâteau to de Chémant, appears in a very scarce 1791 pamphlet—hitherto unrecorded in dental bibliography—in the writer's library.

In unmistakable terms, Duchâteau paid high tribute to de Chémant's mineral teeth. Let me quote one or two excerpts!

> . . . unite beauty, solidity and salubrity, qualities attested by experience . . . I think myself bound to give this attestation, as well as to acknowledge the truth and to do justice to the talents of M. de Chémant. . . .

Why then should Duchâteau, shortly afterwards, pursue an apparently "Jim Crow" policy by raising a legal action (which was unsuccessful) aimed at having de Chémant's invention annulled? A possible explanation is that vanity and jealousy had, in the interval, aroused certain pygmy-minded dentists, whose incomes had markedly declined due to the introduction of de Chémant's teeth, to influence Duchâteau to seek redress.

The impact of this epoch-making invention will be more fully appreciated when it is realized that, until then, there had not been any satisfactory alternative to the use of human teeth or those carved from bone or ivory for artificial restorations. These, in time, so markedly deteriorated as to convince de Chémant that oral hygiene could not be promoted except by substituting mineral teeth. This opinion could not be disregarded, as he was undoubtedly a well-known surgeon, who practised as a dentist in Paris.

Although it was stated by an anonymous writer in 1821 that, prior to studying surgery, de Chémant had been trained as a box-maker, the writer has been unable, in spite of considerable research, to unearth any reliable evidence to support such an assertion.

With France in the throes of a revolution, de Chémant, like many of his compatriots, emigrated to London, where, according to advertisements in the writer's collection, he was certainly on June 22, 1791 (highly probably months earlier), practising at "19 Carlisle Street, Soho", his hours being from 10 till 4 o'clock. He remained at this address until, it is believed, the end of July, when he returned to Paris, where he was located at "1 Place et Cul-de-Sac de Conty, derrière la Monnoie". Consequently, Guerini and others are inaccurate in stating that he first came to London in 1792.

From the standpoint of dental history, it is indeed fortunate that de Chémant was granted, on May 11, 1791, a British patent for his mineral-paste teeth because, from the Specification, information is available as to their composition, etc.

The following is a brief description of the process:—

Impressions of the mouth were taken in softened wax, and into these plaster-of-Paris was poured in order to produce accurate models.

The ingredients of his mineral paste included sand, barilla, marl, and water. This composition was kneaded to become flexible and compact before being pressed into the plaster model. Afterwards, it was dried in front of a fire. When it had become sufficiently hard, the teeth were carved to proper outline with a pen-knife; and the entire restoration enclosed in a specially prepared oven.

The next process was enamelling. A mixture of lead, pewter, sand, barilla, spermaceti, borax, and red lead was applied with a hair-pencil and the denture returned to the oven.

The part representing the gum was painted with a mixture of carmine and spirit of turpentine and again baked in the oven.

Although de Chémant's restorations aroused the ire of many "ivory and bone" dentists, his invention was enthusiastically lauded by many well-known personalities, such as John Hunter, Joseph Fox, Edward Jenner, Sir Walter Farquhar, Sir Everard Home, Sir James Earle, Dr. William Rowley, Jessé Foot; and by the Academy of Sciences (Paris), the Faculty of Medicine, University of Paris, etc.

In 1797 de Chémant published a treatise in English (a translation of an earlier work in French) outlining the scope of his invention,

N° 1, FRITH-STREET, SOHO-SQUARE.

NEW DISCOVERY of Artificial Teeth and Gums, resembling Nature.

SANCTIONED By his Majesty's Royal Letters Patent, AND APPROVED BY THE FACULTY AND SOCIETY OF MEDICINE, AND BY THE ACADEMY OF SCIENCES OF PARIS.

MR. DE CHEMANT, Surgeon Dentiſt, from Paris, Inventor of new artificial Teeth, thinks it incumbent upon him to return his grateful thanks to the Nobility, Ladies and Gentlemen, who have honoured him with their confidence for theſe five years paſt, during his reſidence in London; and to inform them and the public at large, that in conſequence of the ſucceſs he has met with in England, he has taken a commodious houſe, (No. 1, *Frith-Street, Soho*) in every reſpect adapted to his profeſſion, and has fitted up various apartments for the convenience of thoſe who would wiſh to conſult him, without the poſſibility of being ſeen by any other perſon, who may at the ſame time be waiting for the like purpoſe.—Theſe new artificial Teeth are made of paſte, compoſed of mineral ſubſtances, which, as it is at firſt ſoft and pliant, admits of being adapted to the natural form of the mouth, and, by due preparation, becomes as hard and poliſhed as the natural Teeth, likewiſe is ſuperior to all other ſubſtances hitherto invented, in as much as it does not change its colour, wear away, or by abſorbing the juices of the mouth, cauſe an offenſive ſmell, which all other ſubſtances hitherto made uſe of, are well known to do.

Hitherto the infirmities of perſons, who have loſt by various accidents their noſe, palate, or lips; ſome, part of the jaws, cheeks, or even of the ſcull have been very imperfectly remedied; but by means of Mr. De Chemant's paſte it is completely accompliſhed, as it unites the advantages of being apt to receive whatever impreſſion or colour may be neceſſary. The afflicted have the ſatisfaction of ſupplying their defects, by Mr. De Chemant's mechaniſm, with the advantage of thoſe extraneous parts never acquiring any offenſive ſmell.

Mr. De Chemant, to fix ſtill more the attention of the public to his moſt uſeful diſcovery, and to inform thoſe perſons who may accidentally not be yet acquainted with it, thinks it neceſſary to inſert here the approbation of the Faculty and Academy of Sciences of Paris, and alſo the above Figures, which will demonſtrate to the Reader the ſimplicity of the mechaniſm and ſprings, which he has contrived to keep the artificial Teeth, and ſets of Teeth, firm in the mouth.

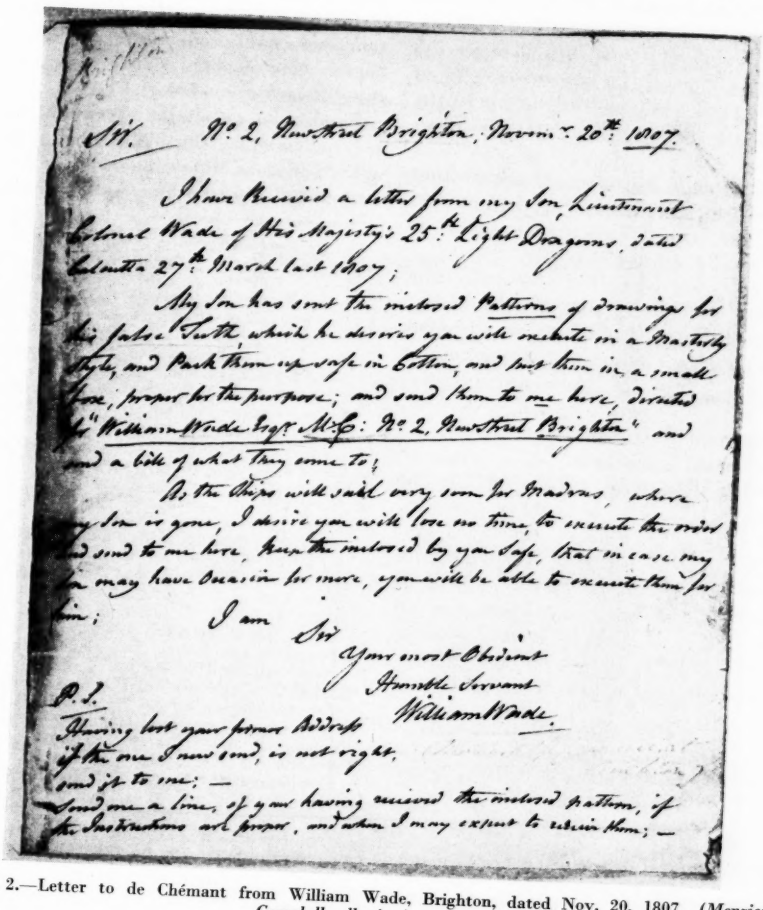
Fig. 1.—Front page of 4 pp. leaflet issued by de Chémant, and addressed to "The Master of the House", *c.* 1796. (*Menzies Campbell collection.*)

etc. It is very intriguing to learn from this that those patients who paid an annual professional fee (amount unstated) could consult him on Mondays, Wednesdays, and Saturdays from 10 till 2 o'clock. Others would be seen on Tuesdays, Thursdays, and Fridays from 12 till 2 o'clock.

In the writer's collection, besides the pamphlet already mentioned, there are two scarce de Chémant items, both illustrated here.

Fig. 1 depicts the front page of an unrecorded four-page leaflet bearing the address, "No. 1, Frith Street, Soho Square". Although undated, it would appear to have been circulated in 1796, confirmed by the statement that, by then, he had been practising in London for five years. From further evidence, this was still his address at the end of 1796 and in 1797.

On page 3 of this leaflet it is stated that, besides constructing and fitting teeth of mineral-paste, he practised the various branches of dental surgery "with more facility as surgery was his profession at Paris, previous to his late discovery" (to quote his own



Sir. No. 2, Hunstreet Brighton, Novem.r 20th 1807.

I have Received a letter from my Son, Lieutenant Colonel Wade of His Majesty's 25th Light Dragoons, dated Calcutta 27th March last 1807;

My Son has sent the inclosed Patterns of drawings for the false Teeth, which he desires you will execute in a Masterly Style, and Pack them up safe in Cotton, and put them in a small Case, proper for the purpose; and send them to me here, directed for "William Wade Esqr M.P.: No. 2, Hunstreet Brighton" and send a bill of what they come to;

By the Ships will sail very soon for Madras, where my Son is gone, I desire you will lose no time, to execute the order and send to me here, that the inclosed by you safe, that in case my Son may have occasion for more, you will be able to execute them for him;

I am Sir

Your most Obedient

Humble Servant

William Wade.

P. S.

Having lost your former Address if the one I now send, is not right, send it to me; —

Send me a line, of your having received the inclosed Pattern, if the Instructions are proper, and when I may expect to receive them; —

Fig. 2.—Letter to de Chémant from William Wade, Brighton, dated Nov. 20, 1807. (*Menzies Campbell collection.*)

words). He added that should any patient be dissatisfied with a finished artificial restoration, he or she would not be expected to accept it.

An interesting feature is that this particular leaflet was addressed "To the Master of the House". Doubtless, it was slipped under the front door, as apertures for letters were seldom in evidence until after the introduction of the penny post, in 1840, by Mr. (later Sir) Rowland Hill.

It is intriguing to learn from Pearlman that correspondence is extant proving that, in 1800 and 1801, the firm of Wedgwood supplied de Chémant with a variety of pastes.

Fig. 2 likewise represents a very interesting unrecorded item, an original manuscript letter, dated Nov. 20, 1807, to de Chémant from William Wade, Master of Ceremonies at the Pavilion, Brighton. It is an order for artificial teeth to be sent to his son in Calcutta.

De Chémant continued to practise in "Frith Street" until June, 1825, when he advertised a change of address to "7, rue Vivienne, Paris", where he could be consulted daily from 11 till 3 o'clock. He added that his London practice was now in charge of his brother-in-law, W. H. Mortimer.* Such irrefutable evidence flatly contradicts the oft-repeated statement made by many historians that he died in 1824. In fact, despite laborious efforts, no date can, as yet, be assigned as to his death.

With the introduction of individual porcelain teeth, in 1808, by Guiseppangelo Fonzi, de Chémant's restorations naturally steadily declined in popularity; by the 1820's they were entirely superseded. Nevertheless, no history of dental prosthesis could claim to be, even reasonably adequate, without several pages being devoted to de Chémant's outstanding achievements.

Finally, let no one be so unduly biased as to condemn de Chémant for indulging in advertising, as this was then regarded as customary. *Autres temps, autres mœurs!*

* Author of: *Observations on the Growth and Irregularities of Children's Teeth* (1st ed., Paris, 1836; 2nd ed., London, 1849).

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Surgical Removal of Impacted Teeth, using Air Turbine Unit

An air turbine capable of speeds in excess of 250,000 r.p.m. was used with a sterile isothermal, distilled water, coolant spray. Hand-piece, tubing, and burs were sterilized in formalin chambers for two hours, or overnight, and were then carefully washed with sterile distilled water.

Nos. 8 and 10 round burs, and No. 557 cross-cut, tungsten-carbide fissure burs with special shanks $\frac{3}{8}$ in. longer than conventional contra-angle burs, were used.

Bone could be wiped away from the tooth with the round burs and then the tooth divided with the fissure burs.

One hundred and twenty teeth have been removed by this technique. Operating time was reduced by 30–40 per cent and post-operative pain reduced by some 50 per cent. Virtually, no pain was referable to the temporomandibular joints.—HALL, R. M. (1959), *J. oral Surg.*, **17**, 3.

DIABETES AND PERIODONTAL DISEASE*

By **W. J. BAIRD**, F.D.S., L.D.S. R.C.S.

MR. PRESIDENT, Members of the British Society of Periodontology, as one of your more recent members I feel greatly honoured to deliver a Paper to the Society.

The title of the paper was suggested to me more as a leading question with any alteration permissible in grammar, but not in subject matter. The title I chose, however, gave me an opportunity of incorporating two short surveys which were undertaken in Edinburgh from 1956 until 1958.

I had intended writing a report on these surveys after my colleague, Dr. J. W. Galloway, had published in detail the method we adopted in examining our patients. Dr. Galloway is now Senior Dental Officer, Scotland, and has had so many demands on his time that the promised paper is not yet ready for publication. I shall, therefore, summarize, as briefly as possible, this method of examination.

In order to record our findings we used a standard dental chart with a table at one side, the headings of the table being the patient's age, the number of teeth present, the D.M.F., the masticatory potential, the periodontal score, the P.M.A. index, and the date. (*Fig.* 1, *Table I.*)

The first step in assessing the patient's dental score (as we called it), after taking the necessary particulars of name, sex, age, etc., was to chart the mouth, marking on the dental chart the position of the erupted teeth and the presence of fillings and cavities. The teeth were then counted and the number placed in the appropriate position on the table. If teeth were still to erupt the number was added to the last figure with a plus sign in front.

We modified the D.M.F. index to give three separate totals followed by the numbers 1, 2, or 3, depending upon the average number of tooth surfaces involved in the filling or caries.

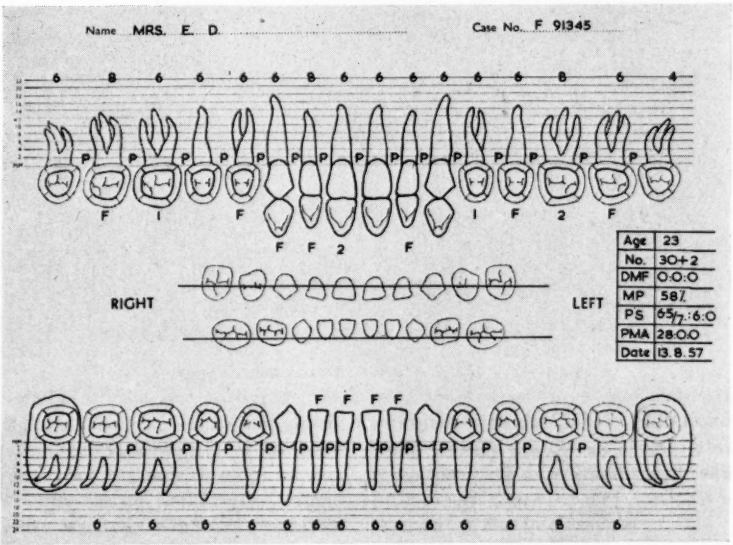

Fig. 1.—Specimen dental score.

* Given at the meeting of the British Society of Periodontology held on November 9, 1959.

The masticatory potential we obtained by giving each tooth a number depending upon its position in the dental arch, the tooth-to-tooth contact in centric occlusion, and the type of tooth involved. The numbers given to each tooth were added together mentally and the total placed in the appropriate place on the table. This figure was a percentage if all the teeth were present in the adult. The maximum number we gave to each tooth in turn was as follows: Central and lateral incisors, 1; Canines, 2; Premolars, 4; First and second molars, 5; Third molars, 3.

We then recorded the periodontal score and to do this each tooth was first tested for mobility against digital pressure. If the tooth just visibly moved, a figure of 1 was given; movement up to 1 mm., a figure of 2; movement greater than 1 mm., a figure of 3. These figures were placed on the inner side of the teeth on the dental chart to avoid confusion with the numbers which were used to record the state of the periodontium.

Each tooth was then subjected to a percussion test, the shaft of a mouth mirror percussing the tooth against a finger resting against the opposite tooth wall. If "fremitus" was elicited the letter "F" was placed opposite the tooth on the inside of the line. As this was a finer assessment of periodontal change than mobility, those teeth which already had a mobility number were ignored at this examination. Teeth which gave no response to either of these tests were not marked.

The next step was a visual examination of the gingival papilla, gingival margin, and

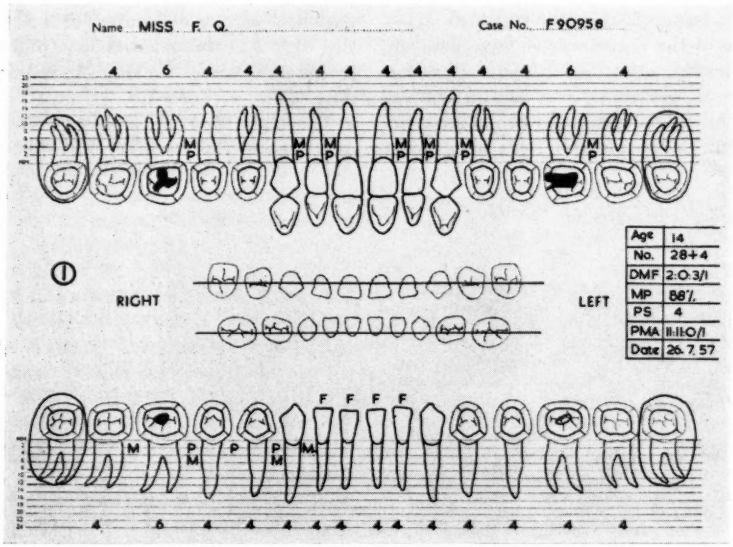

Fig. 2.—*Case* 1. Dental score.

Table I.

Age	23
No.	30+2
D.M.F.	0 : 0 : 0
M.P.	58 per cent
P.S.	6·5/7·0 : 6·0
P.M.A.	28 : 0 : 0
Date	13.8.57

attached gingiva of each tooth, marking on the chart the position of areas of inflammatory change. Then, using a blunt probe, an examination was made of the gingival sulcus and a number from 0 to 8 was given to each tooth in the upper jaw, the lower jaw, and the whole mouth respectively. The figures were placed in the appropriate place on the table.

As any inflamed gingival papillæ, gingival margins, and attached gingivæ had already

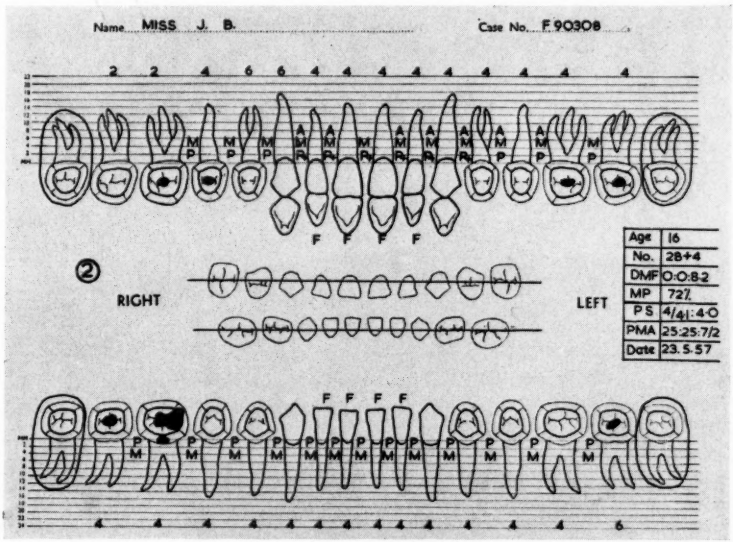

Fig. 3.—*Case* 2. Dental score.

on the outer side of the line to denote the periodontal state:—

0. Normal periodontium.

1. Mild gingivitis not circumscribing the tooth.

2. Gingivitis. No apparent break in the epithelial attachment.

4. Early absorption of the alveolar crest, early pocket formation.

6. Gingivitis with pocket formation and/or bone loss up to half the length of the root, or mobility.

8. Advanced bone destruction (mobility 2 or 3), dull on percussion, bone loss involving more than half the root length.

The numbers for each tooth were then added together and divided by the number of teeth present. This was done first for the upper jaw, then the lower, and finally the whole mouth. The result was three sets of figures representing the mean periodontal scores for the teeth been marked on the dental chart, the simple addition of these P's, M's, and A's produced three figures for the P.M.A. index. These figures were then placed on the table followed by a severity number (1, 2, or 3) to denote the severity of the inflammation.

We now had on the dental chart the results of a comprehensive examination of each tooth which could be supplemented by full-mouth radiographs if required; and on the table a series of figures related to the age of the patient.

The periodontal score gave a general indication of the periodontal condition and the deduction we made was as follows:—

0 to 0·5.—Moderate gingivitis, intact epithelial attachment, prognosis good.

0·5 to 2·0.—Stage prior to advanced periodontal disease, moderate alveolar involvement which may be general or confined to individual teeth or groups of teeth.

2·0 to 5·0.—Established periodontal disease. Alveolar resorption moderate to advanced. Prognosis fair to bad.

5·0 to 8·0.—Advanced alveolar resorption. Prognosis bad.

gingivæ varied widely in severity, extent, and location.

Four had a periodontal score between 4 and 6, some had caries, all had some inflammation of the papillary and marginal gingivæ varying

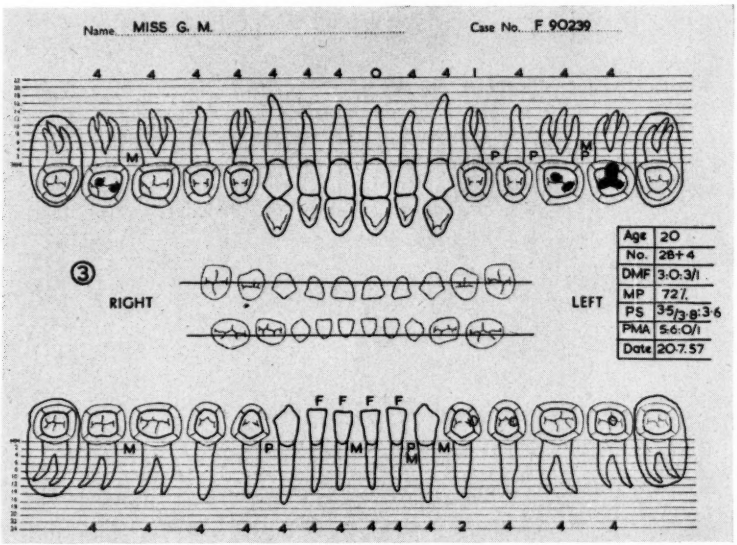

Fig. 4.—*Case* 3. Dental score.

The prognosis was modified in relation to age. After the age of 40 years it can be presumed that physiological recession of gingiva and alveolar bone is progressing.

Having used the dental score routinely for one year we examined a cross-section of patients in the Diabetic Department of the Royal Infirmary of Edinburgh. The patients were controlled diabetics of all ages, and a large percentage of them were edentulous: with them we attempted to establish the cause of tooth loss.

Eighty-seven patients were examined and of these 53 were edentulous. Of these edentulous patients 39 claimed that the tooth loss was due to caries, 10 to "pyorrhœa", and 4 to both caries and periodontal lesions.

In the dentulous group 3 had a periodontal score of 6 or over, none of them had caries or marked inflammation of the attached gingivæ; inflammation of the papillary and marginal in severity and location; none of them had inflammation of the attached gingivæ.

One had a periodontal score between 3 and 4 with caries and no inflammation of the gingival tissues.

Five had a periodontal score between 2 and 3 with caries, papillary and marginal inflammation varying in severity and location; none had inflammation of the attached gingivæ.

Seven had a periodontal score between 1 and 2 with caries and inflammation of the papillary and marginal gingival tissues which varied in severity and location.

This small survey was undertaken mainly as an exercise in the use of the dental score and also to find out, in a general way, the dental picture in the controlled diabetic patient. The numbers were too small to allow for statistical analysis but it was felt, from the periodontal aspect, that the results

compared with those of Mallaowalla and Koppikar (1958), whose summing-up was: "In controlled diabetics there are no characteristic gingival or periodontal lesions."

As the Diabetic Department of the Royal Infirmary was interested in the 17-ketosteroid metabolism, I asked them to examine some patients with periodontosis whom I was treating at this time. I wished to ascertain the 17-ketosteroid levels of these patients as a follow-up to the work done on this condition by Ross, Kupperman, and Miller in 1955. These workers claimed to have found that in the patient with periodontosis the 17-ketosteroid values were at the lower limits of normal while the glucose tolerance was increased. No abnormality in the glucose tolerance or the 17-ketosteroid metabolism was found in the patients whom I sent for examination.

About the same time, however, I sent another group of patients for examination and the results of this series were interesting.

The similarity in dental pathology in this group can best be seen by studying their dental scores. They could be classified as suffering from pyorrhœa simplex or chronic generalized marginal gingivitis with pocket formation. They all had good dental arches of which models were taken. A bite analysis was undertaken for each case using open-resting and protrusive check-bites, the lateral condylar angles being obtained from the Hanau equation. No gross prematurities in occlusal contact were detected.

I should like to discuss these patients in age order with the aid of their dental scores.

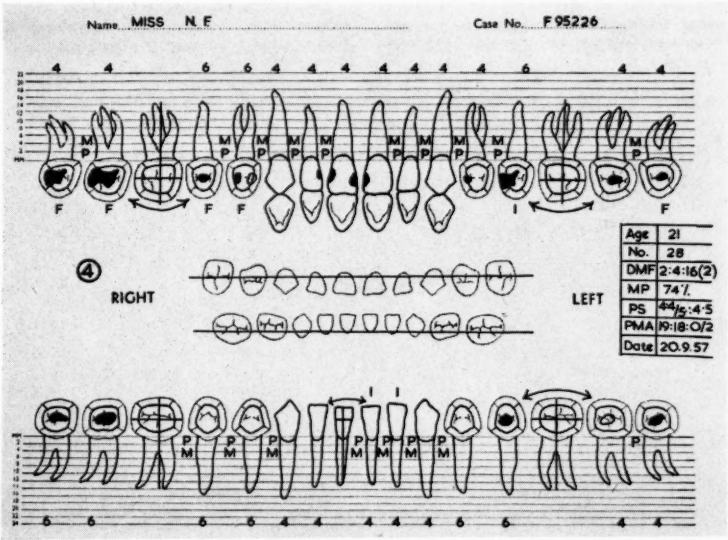

Fig. 5.—*Case* 4. Dental score.

CASE REPORTS

Case 1 (*Fig.* 2).—This 14-year-old girl was referred by her school dental officer for treatment of an inflammatory gingivitis which was difficult to control. She had a good standard of oral hygiene, a competent lip posture, and was not mouth breathing.

It can be seen from the dental score that she had a good dentition, 28 teeth in the arch; the 88 per cent for 28 teeth being the highest masticatory potential possible. She had a low caries incidence and a mild papillary and marginal gingivitis as located in the dental chart. The periodontal score of 4 which was common to upper and lower jaw denoted general pocket formation around every tooth.

From the medical history it was noted that her birth weight was 9½ pounds and her mother had a diabetic history with pruritis, polyuria, and nocturia. Height 5 ft. 1 in.; weight 19 st.

ORAL GLUCOSE TOLERANCE TEST

Fasting	½ hr.	1 hr.	1½ hr.	2 hr.	2½ hr.	3 hr.	Lowest Value
64	137	77	56	50	60	58	50

Case 2 (*Fig.* 3).—This young lady, aged 16 years, a dental receptionist, was referred by her dentist employer for treatment of a hyperplastic gingivitis with halitosis. She had a good standard of oral hygiene and a full complement of teeth, the drop in masticatory potential being due to a crowded dentition with a slight anterior open bite and an incompetent lip posture. She had a moderate caries incidence with a marked hyperplasia of the gingival papillæ, inflammation of the papillary, marginal, and attached gingivæ especially in the upper anterior area. The periodontal score of 4 was common to upper and lower jaws and denoted true pocket formation around every tooth with the exception of two.

ORAL GLUCOSE TOLERANCE TEST

Fasting	½ hr.	1 hr.	1½ hr.	2 hr.	2½ hr.	3 hr.	*Clinically reactive* Lowest Value
73	102	65	48	68	63	71	48

Case 3 (*Fig.* 4).—This young lady, aged 20 years, had been referred two years previously for treatment of a chronic periodontal condition, and gingivectomy had been performed then. She had been recalled for a routine examination and it was noted that she had active caries. She had slight crowding of the dentition producing a lower masticatory potential. From the P.M.A. index it would appear that the gingivectomy had not been successful. From the periodontal score it can be seen that there is true pocket formation in most areas. With the exception of lassitude there was no significant finding in the medical history.

ORAL GLUCOSE TOLERANCE TEST

Fasting	½ hr.	1 hr.	1½ hr.	2 hr.	2½ hr.	3 hr.	Lowest Value
79	103	86	72	57	68	64	57

Case 4 (*Fig.* 5).—This young lady, aged 21 years, was referred by her medical practitioner for dental examination prior to treatment at a rheumatic clinic. It can be seen from the dental score that she had a high caries incidence, a well-marked papillary and marginal gingivitis with true pocket formation in all areas; around 9 of the teeth the alveolar bone loss involved half the root; the masticatory potential denoted good occlusal contact in centric occlusion. She had a medical history of "sugar in the urine in childhood", attacks suggestive of hypoglycæmia for one year previously, and odd "rheumatic" complaints.

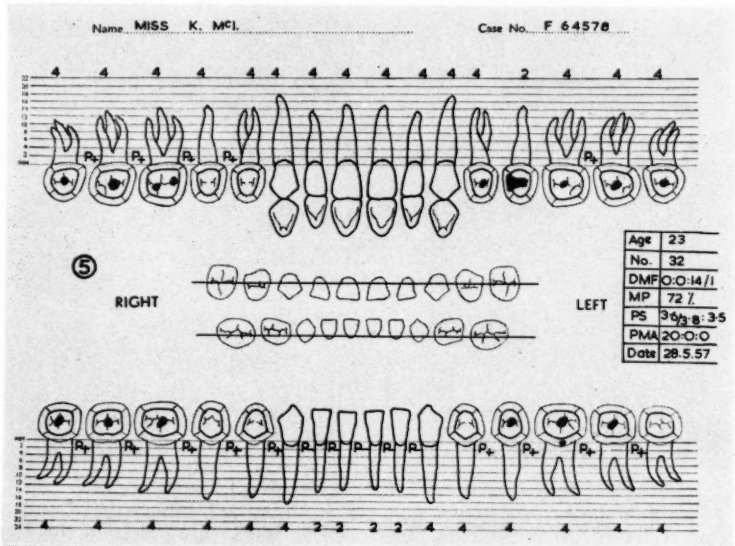

Fig. 6.—*Case* 5. Dental score.

ORAL GLUCOSE TOLERANCE TEST

Fasting	½ hr.	1 hr.	1½ hr.	2 hr.	2½ hr.	3 hr.	*Clinically reactive* Lowest Value
71	132	154	132	71	45	48	45

Case 5 (*Fig.* 6).—This intelligent school teacher, aged 23, presented for treatment of halitosis. She had a papillary gingivitis with true pocket formation in most areas, a lowered masticatory potential due to crowding of the dentition; a low caries incidence. Apart from a complaint of chronic fatigue there was little of interest in the medical history.

ORAL GLUCOSE TOLERANCE TEST

Fasting	½ hr.	1 hr.	1½ hr.	2 hr.	2½ hr.	3 hr.	*Clinically reactive* Lowest Value
50	100	68	43	68	35	47	35

Case 6 (*Fig.* 7).—This lady, aged 30 years, a mother with two children, was referred by her dentist for treatment of a hyperplastic gingivitis, the distribution of which can be seen on the dental chart. The masticatory potential was high, with a moderate caries incidence; true pocket formation was present in most areas. It was noted that she had glycosuria during her second pregnancy; her mother was obese and under treatment for "sugar"; the patient's brother and sister weighed 12½ lb. and 10 lb. at birth respectively.

ORAL GLUCOSE TOLERANCE TEST

Fasting	½ hr.	1 hr.	1½ hr.	2 hr.	2½ hr.	3 hr.	Lowest Value
84	132	109	83	61	59	—	59

Case 7 (*Fig.* 8).—This intelligent Spanish lady, aged 30 years, was referred by her dentist for treatment of pyrrhœa simplex. She had a marked papillary and marginal gingivitis with true pocket formation in most areas; an excellent dentition with low caries incidence; a reduction in the masticatory potential in the molar segments due to extraction of both lower first molars. She was concerned that she had no children after seven years of marriage. Physical examination revealed male distribution of hair and marked hirsutism. It was considered possible that she had a mild adrenal hyperplasia.

ORAL GLUCOSE TOLERANCE TEST

Fasting	½ hr.	1 hr.	1½ hr.	2 hr.	2½ hr.	3 hr.	*Clinically reactive* Lowest Value
83	115	80	35	65	73	—	35

Case 8 (*Fig.* 9).—This man, aged 42 years, was advised to attend the Dental Hospital by his medical practitioner, who was treating him for coronary thrombosis. His dental score was estimated one year following full-mouth gingivectomy. His caries incidence was moderate and there was true pocket formation in most areas. He had his first attack of coronary thrombosis in 1951, when a full medical history was recorded. An investigation of the oral glucose tolerance undertaken in 1951 was noted as "suspicious". On examination he had hypercholesterolæmia, hypertension, and intermittent claudication.

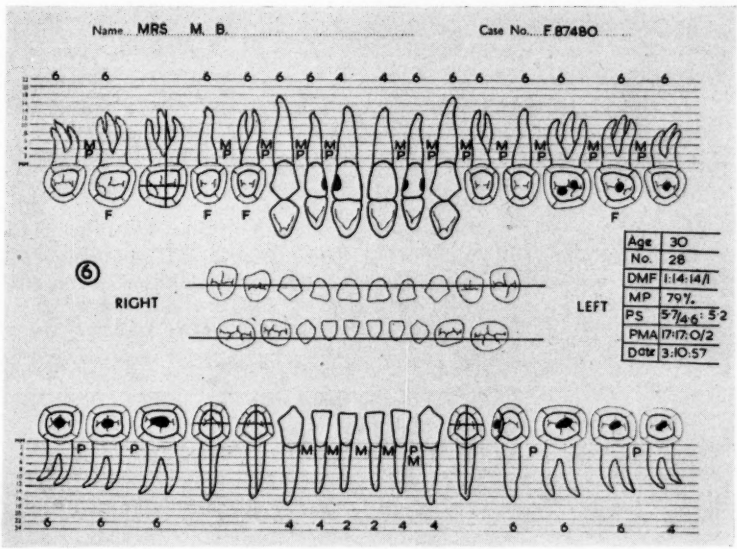

Fig. 7.—*Case* 6. Dental score.

ORAL GLUCOSE TOLERANCE TEST

Fasting	½ hr.	1 hr.	1½ hr.	2 hr.	2½ hr.	3 hr.	Lowest Value
78	162	84	42	61	51	—	42

The interesting feature common to all these patients was that they exhibited on their glucous tolerance tests a range of values which are thought by some workers to denote an abnormal sugar metabolism in that a graph of these figures produces a "flat sugar

curve". And further to that they were sent for this examination because of a similarity in dental pathology.

The opinion of my colleague who supervised the tests was that these patients were probably "pre-diabetics" or in the prodromal stage of

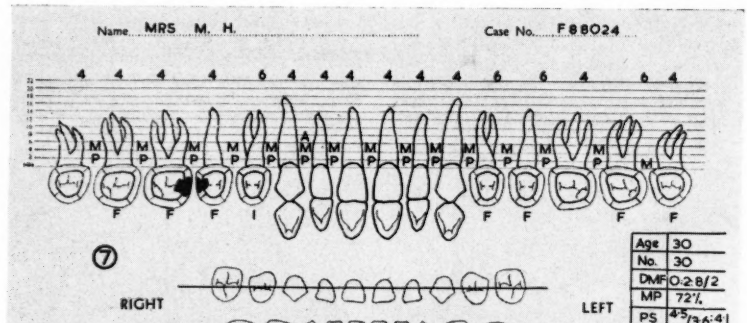

Fig. 8.—*Case* 7. Dental score.

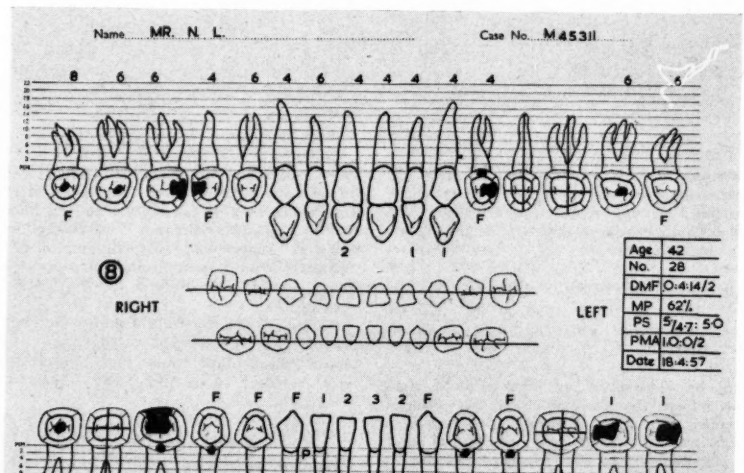

Fig. 9.—*Case* 8. Dental score.

diabetes mellitus. This symptom-complex is described by Allen (1953).

An opinion was put forward that the characteristic sugar curves noted in this group may have been due to the presence of an over-active and excitable autonomic nervous system.

The glucose tolerance test was the standard 50 g. with samples taken every $\frac{1}{2}$ hr. for 3 hr. The blood-glucose estimation was done by the Nelson-Somogyi technique.

CONCLUSION

I have described the dental score—a method of dental examination which is useful for record and follow-up purposes.

A brief dental survey is given on a small cross-section of patients with controlled diabetes mellitus.

I have discussed in some detail the dental scores of 8 patients with a similar dental pathology and given the results of oral glucose tolerance tests undertaken for each. The graph for each produced some flattening of the "sugar" curve and the suggestion has been made that these patients may be "prediabetics".

Acknowledgements.—I would like to thank my colleague, Dr. J. W. Galloway, who devised the dental score and the masticatory potential and with whom I co-operated in the survey on the controlled diabetic patients; Professor J. Boyes and the staff of the Pathology Laboratory of the Edinburgh Dental Hospital, in particular Mr. Hunter, O.B.E., and Miss Benstead, for preparing the slides and prints; and the Diabetic Department of the Royal Infirmary of Edinburgh for their co-operation in this work.

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BOOK REVIEWS

BACTERIOLOGY FOR STUDENTS OF DENTAL SURGERY. By R. B. Lucas, M.D., M.R.C.P., D.P.H., Professor of Oral Pathology, University of London, Pathologist, Royal Dental Hospital of London, and Ivor R. H. Kramer, M.D.S., L.D.S. R.C.S., Reader in Oral Pathology, University of London, Head of Department of Pathology, Institute of Dental Surgery and Eastman Dental Hospital. Second edition. 8×5 in. Pp. 288+viii, with coloured frontispiece and 58 illustrations. 1959. London: J. & A. Churchill Ltd. 27s. 6d.

The authors of this book, as they stated in the Preface to their first edition five years ago, intended it to give the dental student a reasonable overall picture of bacterial diseases and how they are caused, without concentrating unduly on detailed descriptions of individual bacteria. In this they succeeded, and in the second edition they have managed to bring the volume up to date while increasing the size by only 26 pages. The larger size is mainly caused by expansion of the sections on Chemotherapy, Viruses, and Bacterial Endocarditis. The illustrations are well chosen and well reproduced, although the colours of Fig. 4 of the Frontispiece (mixed growth of *Staph. aureus* and hæmolytic streptococci) still leave something to be desired. There are one or two other minor criticisms which might be made. For example, the description of sterilization in an autoclave is correct for the type commonly used in a bacteriology laboratory, but not adequate for those in general use in hospital practice, so that the problem of the penetration of dressings by steam is not mentioned. Again, in the section on Tetanus no mention is made of the dose of anti-tetanus serum for prophylaxis (although in the section on Diphtheria figures are given), and the impression gained was that tetanus is an

almost always fatal infection, which is now not true. But these are minor criticisms, and this book can most certainly be recommended as giving a good account of the general principles of the subject at the level required by students of dental surgery.

The price has gone up from 22s. 6d. to 27s. 6d., but this seems not unreasonable as medical text-books go. C. S. C.

THE MANAGEMENT OF ORAL DISEASES. A Treatise on the Recognition, Identification, and Treatment of Diseases of the Oral Regions. By JOSEPH L. BERNIER, D.D.S., M.S., F.D.S. R.C.S.(Eng.), Colonel, Dental Corps, United States Army; Chief, Oral Pathology Division, Armed Forces Institute of Pathology, etc. Second edition. $9\frac{3}{4} \times 6\frac{3}{4}$ in. Pp. 875, with 1031 illustrations and 5 coloured plates. 1959. St. Louis: The C. V. Mosby Co. (London: Henry Kimpton.) £5 12s. 6d.

THIS book, which has now entered its second edition, is one that can be warmly recommended to all who require a book dealing with the clinical pathology of oral disease.

The author is to be congratulated on the clear exposition of his subject, the logical make-up of the book, and the excellence of illustrations. As one reads the book it is forcibly made plain to one that oral disease and general pathology are but a special aspect of general disease and general pathology. The references given at the end of each chapter are very full. So numerous are these that I think it unlikely that any reader will undertake a systematic programme of reading the originals.

It is a little bit surprising that a writer of military experience in quoting the work of Wolfe (Harvey Lectures 1943–1944) should state in respect of pain threshold, "This threshold is remarkably uniform and is not greatly influenced by emotional state". Any surgeon who has worked in a battle area knows that this is not so—many severe wounds giving rise to no pain during the excitement of action, but being associated with much pain an hour or so later.

This is perhaps a carping criticism on a very excellent book, but experimental work must be evaluated with the help of actual experience, and everyday knowledge.

R. S. T.

TREATMENT PLANNING IN THE PRACTICE OF DENTISTRY. By HENRY M. GOLDMAN, D.M.D., LESTER W. BURKETT, D.D.S., M.D., and the Staff of the School of Dentistry and Graduate School of Medicine, University of Pennsylvania. 7×5 in. Pp. 305, with 94 illustrations. 1959. St. Louis: The C. V. Mosby Co. (London: Henry Kimpton.) 48s. 6d.

IN this neat and well-illustrated book the authors have attempted to stress the importance of a co-ordinated plan for the dental well-being of the patient, and in this they have succeeded far beyond my expectations. For the sake of clarity and for reference purposes the subject matter has been divided into sections as representative of the specialities, but great effort has been made to avoid undue stress on any procedure to the exclusion of others. The reader feels, at all times, that the overall dental condition of the patient is being considered rather than the construction of unit restorations or the development of any specific therapy. A very great deal of useful information concerning the background of clinical and technical procedures is presented and each section is provided with a short list of references should further detail be required. A small section is devoted to case presentation, and although much of this is not applicable to dental service in Great Britain at the present time, in no way does this detract from the value of the book. J. K. H.

ERRATUM

Ascoxal

It must be pointed out that the price of 5s. per 24 tablets quoted in THE DENTAL PRACTITIONER (Vol. X, No. 4, p. 98) is actually the basic price to the N.H.S. and not the price which a dental surgeon would pay to a dental dealer, or the retail price from a chemist. These prices are as follows:—

Price to dental surgeon, 8s. per carton of 24 tablets.

Retail price, 8s. 9d. per carton of 24 tablets.

THE ORTHODONTIC TREATMENT OF A SET OF UNIOVULAR QUADRUPLETS

By **JOHN C. RITCHIE**, L.D.S. R.C.S. (Eng.)
Westminster Children's Hospital, London

QUADRUPLETS were born in the Westminster Hospital, London, on the night of Sept. 12, 1950. There are reports which suggest that cases of quadruplets are tending to increase, but the rate remains at approximately the cube of the figure for twin pregnancies, i.e., 1 in 600,000 births. As distinct from this, uniovular quadruplets are extremely rare.

There are now five surviving sets of 'quads' in Britain, and the Westminster set is the only example of uniovular quadruplets. The babies were all girls.

The mother already had one son born in 1945. She was a healthy looking, well-nourished woman aged 27 years. Her pregnancy proceeded normally for five months, when she began to show some œdema of ankles and hands. It was found that rest produced an improvement in this condition.

At the end of six months many fœtal parts could be palpated, and approximately one month later the presence of quadruplets was confirmed by X-ray examination.

The patient was then admitted to the Westminster Hospital in view of the œdema of the lower limbs, which subsided with rest in bed.

Special arrangements were made, to be put into operation immediately labour commenced: these included special incubators to be provided by Oxygenaire Ltd., and they were installed in a prepared premature infant room.

On Sept. 12, 1950, 20½ hours after the spontaneous rupture of the membranes, labour commenced, and this was uncomplicated and rapid.

The duration of labour was 3 hr. and 38 min. and all the babies were delivered normally, the times between the births being 14 min., 29 min. and 3 min.

The placenta was a large single structure, with only one cord, the other three being velamentous in type. It was proved both macroscopically and histologically that all four sacs consisted of amnion only, the whole lot being contained by a single chorion and therefore associated with a common placenta—that is, the quadruplets were uniovular.

Blood-testing of the infants and their parents showed the following results:—

	Group		
"M"	A	Rhesus positive	R_1R_2 CDe/cDE
"E"	A	Rhesus positive	R_1R_2 CDe/cDE
"P"	A	Rhesus positive	R_1R_2 CDe/cDE
"F"	A	Rhesus positive	R_1R_2 CDe/cDE
Father	A	Rhesus positive	R_1R_1 CDe/CDe
Mother	O	Rhesus positive	R_2R_2 cDE/cDE
Brother	A	Rhesus positive	R_1R_2 CDe/cDE

Dr. Mourant, of the Lister Institute, has further studied the blood groups of these children, including the M. N. Lutheran and Lewis Kell groups.

All the subgroups are identical in the four quadruplets.

From birth the children came under the care of the Pædiatric Department. Their average weight at birth was 3 lb. 7 oz. They were nursed in Oxygenaire incubators and the oxygen supply was reduced on the 28th day, with air supply only after the 35th day.

They were tube fed with expressed breast milk, up to 5 drachms of three-quarter strength, given 3-hourly.

After the fourteenth day full-strength expressed breast milk was given and by the 32nd day bottle feeding was instituted.

When discharged from hospital on the 69th day each child had doubled her birth weight.

There were no complications after leaving hospital and all the children grew steadily and well.

Given at the Manchester meeting held on April 18, 1959.

They were housed in a large flat in Westminster, where they have continued to live as a very happy family.

These children did not come to my department until they were 5 yr. 11 mth. old and they were then referred for an opinion about their orthodontic condition by the dental surgeon who had been responsible for their conservative treatment. It had to be regretted that each child had already lost both second lower temporary molar teeth and a considerable amount of conservative work had been done.

Fig. 1.—Photograph of the quadruplets before treatment was commenced. Age 5 yr. 11 mth.

The mother was questioned very closely about the children's diet and also about their dental hygiene and it was discovered that there were considerable faults in both these important fields. They were eating far too much starchy food and sugars and not nearly enough protein foods, with vegetables and fruit at a minimal level.

New dietetic factors were explained to the mother and she was most helpful, in that she complied in every detail with regard to a change of diet.

The toothbrush had been used only spasmodically, and as is so often the case, the children had often gone to bed with the remains of milk and biscuits on their teeth.

This, of course, had to be altered and a strict oral hygiene routine established. The mother was very diligent in this matter also, and although she had some difficulty to begin with, she succeeded in a matter of weeks in getting the children to clean their teeth after every meal. An alkaline toothpaste was advised and the children liked the flavour, so all was well.

Fig. 2.—Palm print of "E". Angle at axial triradius equals 70°.

The mother has always maintained that her four children are two sets of twins, because in appearance and temperament that appears to be the case, and although from the medical evidence this cannot be so there are certain factors which emerge to make the mother's contention seem reasonable.

It can be seen (*Fig.* 1) that there is a similar appearance of "M" and "E" and also of "P" and "F". The former are thinner faced, brighter, and more intelligent children, the crowns of their heads are on the left side and their forehead curls both turn to the right.

The latter pair are also similar in appearance and nature. They are larger in head and body and slower in intellect. They both have double crowns, one with forehead curls left and the other right.

Their fingerprints, as one would expect, are all different, although they do show certain similarities.

The palm prints of these children are most interesting when the triradiation angles made by the crests are analysed (*Fig.* 2). There are on every hand three of these angles formed by the junction of the crest lines, one at the base of the hand near the wrist and the other two widely spaced immediately below the fingers.

The points made by these triradiation angles now have to be joined up by straight lines, and it is the angle at the base of the hand in which we are interested. In "P" and "M" these angles are equal at 47°, being found fairly low down near the wrist, but in "F" and "E" the position of the angle is much higher and the angles themselves are 55° and 70° respectively.

Now it is known that in a Mongol child this base angle exceeds 45° and the position of the axial triradius is found more than 40 per cent up the length of the hand, measuring from the distal wrist crease at the base to the proximal crease of the middle finger, superiorly.

It is also noticeable that the fifth digit is short in all these children. Instead of reaching the superior crease on the ring finger, the fifth digit falls short by over $\frac{1}{4}$ in. This is due to a lack of normal development in the middle phalanx and is another diagnostic feature.

All four children have hallucal patterns on the soles of their left feet, which are loop distal, with a ridge count of under 21 (*Fig.* 3). This pattern occurs in 33 per cent of Mongols, as compared with 9·6 per cent of normals.

There are other factors, such as ulnar and radial loops and whorls, but greater detail on these matters should be avoided in this paper.

All four children were brought to the Orthodontic Department by their mother, and it was obviously going to be a most difficult task to differentiate between these children until it was realized that some wise person had sewn the children's initials on their caps and pullovers.

A record card was made out for each child, and once the cases had been assessed, a provisional diagnosis was made.

Impressions for clinical models were taken and lateral skull radiographs and photographs were produced.

The details were then carefully considered, and, although each case was slightly different, the prenormal position of the mandible in three of the children was very similar in each case. The fourth child presented a crossed bite to the left and, although differing from the others, her condition can be considered to have originated in the same way.

Fig. 3.—Calcar mound. Sole of left foot "M" showing hallucal pattern, loop distal.

The mother was quite emphatic that the prenormal position of the mandible was not brought about by the removal of the two temporary second lower molar teeth and this was borne out by the dental surgeon who extracted these teeth.

The mother said that the prenormal condition had not always been present, but was noticed first when the children were about 2 years old.

This bears out my earlier reports on this form of abnormality, which appears to occur when the temporary canine teeth erupt,

between the ages of 18 months and 2 years. In most cases the incisor teeth and the first temporary molars are in normal relationship, when, for some reason, the temporary canine teeth erupt cusp to cusp, giving a bite of two-point contact only.

This is a position of no comfort for rest or mastication, and the mandible therefore slides forward or to the left or to the right and it is almost a matter of chance as to which way it does move.

In the same way that there is a history of twinning, though not a strong one, on the father's side of the family, so there is a history, and indeed present evidence, of a Class III relationship in the father's dentition. As distinct from this, the mother has a normal relationship, although she wears a full upper denture now.

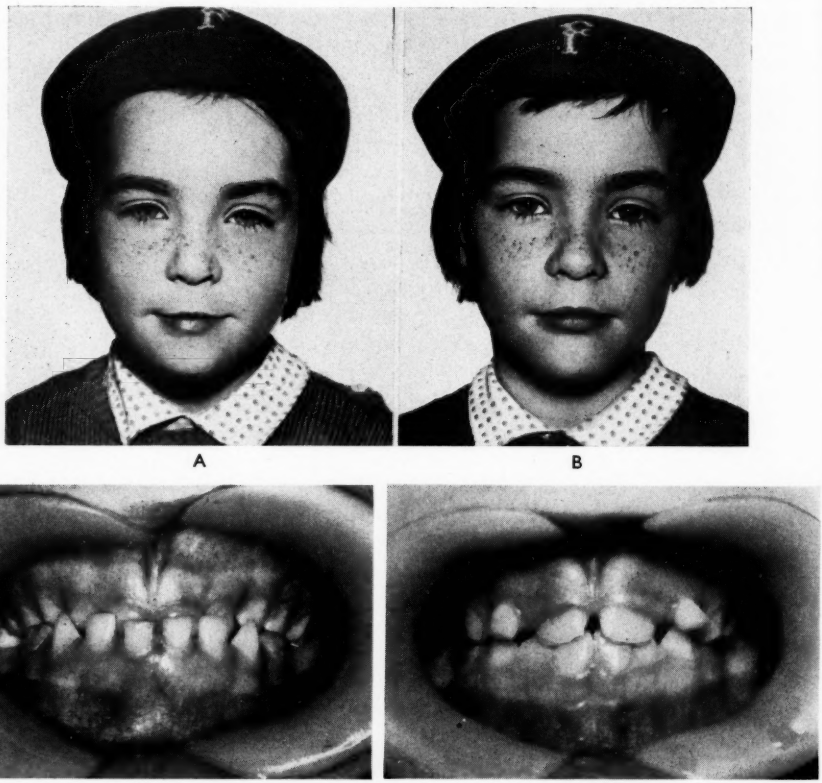

Fig. 4.—A, Photograph of "F" before treatment. B, Photograph of "F" after treatment. Note growth in the middle third of the face and improvement in appearance of nose, upper lip, and red margin. C, Class III relationship before treatment, "F". Identical condition present in "E" and "P". Age 5 years 11 months. D, Incisor relationship after treatment, "F". Identical result obtained in the case of "E" and "P". Age 7 yr. 2 mth.

All four quadruplets presented a very flat profile, which can be associated with a mild pre-normal mandibular position at 6 years of age.

The lower lip appeared to be everted and pouting in each case.

There was wide setting of the eyes and bridge of the nose.

The wide setting of the eyes or ocular hypertelorism (*Figs.* 4, 5) has been noticed in many cleft palate patients, and clefts of lip and palate appear to be more prevalent in families with a history of twinning and club-foot.

This craniofacial deformity is associated with undue separation of the orbits and is primarily due to abnormal development of the sphenoid bone during the early fœtal life and is connected with a disturbance in the function of the pituitary gland.

Three of the children have a prenormal occlusion with mandible centric (*Fig.* 4C). The fourth child has a crossed-bite on the left side and although the mandible is only about $\frac{1}{8}$ in. out of centric in the tooth position, the full face shows a considerable deviation of the chin to the left (*Fig.* 5A).

A condition of this kind can often go unnoticed by parents, and if left beyond 7 years of age can have serious effects on the temporomandibular joint and the growth centre in that area.

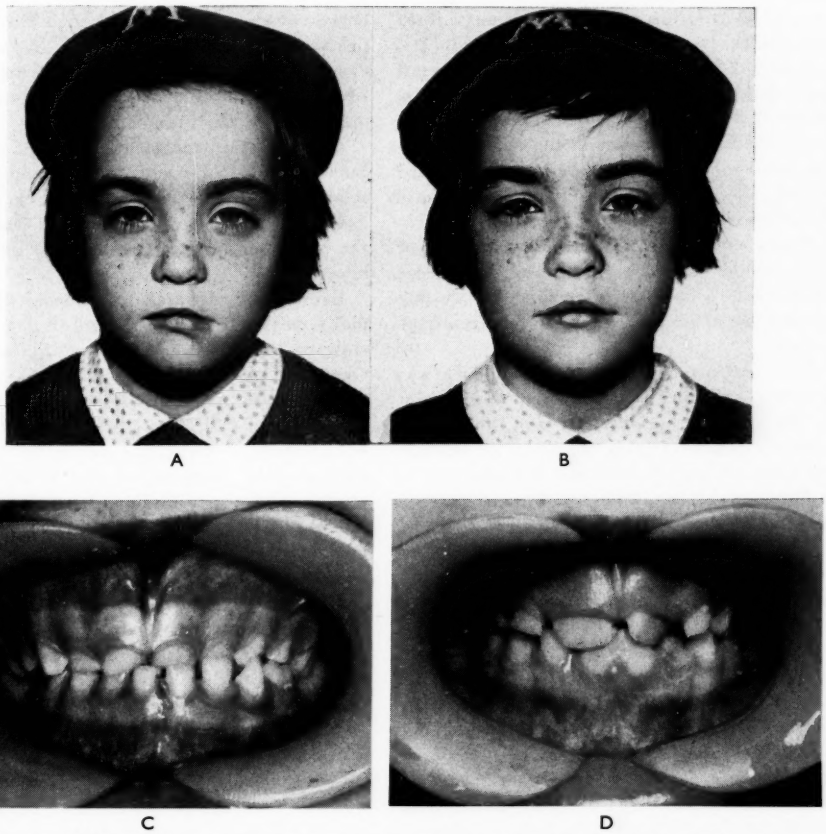

Fig. 5.—A, Photograph of "M" before treatment, showing deviation of the chin to the left. B, Photograph of "M" after treatment. Note growth in the middle third of the face and improvement in the appearance of the nose, upper lip, and red margin. C, Crossed-bite before treatment, "M". Age 5 yr. 11 mth. D, Incisor relationship after treatment, "M". Mandible now in centric occlusion. Age 7 yr. 2 mth.

TREATMENT

The orthodontic treatment to be described was essentially simple in character; in fact, simple treatment instituted just at the correct time is the criterion of success in many of our orthodontic cases.

It would have been preferable, however, if these children had been seen some two years earlier at 3 yr. 11 mth., instead of at 5 yr. 11 mth., because the sooner in life that the prenormal mandible is controlled in its forward growth, the greater is the chance of ultimate success, without relapse.

At the earlier age, all the temporary incisor teeth would still have been firm, but these quadruplets were fortunately just a little late in shedding their upper and lower temporary incisors.

The treatment plan for these children was to obtain an upper incisor overlap and overjet at the earliest opportunity and hence put some natural restraining influence on the forward unrestricted mandibular growth.

A removable appliance was used in each case.

The bite was opened on occlusal bite platforms cast in "B" metal, thus allowing the mandible free and uninterrupted movement.

The upper labial segment of six anterior temporary teeth was carried forward by means of a Glen Ross expansion screw, embedded in the anterior part of the palate of the appliance. Retention was by means of modified Adams's cribs posteriorly and plain cribs anteriorly.

It was noticed almost immediately that the mandibular teeth could bite into an edge-to-edge position with the uppers and invariably did so when the mandible was given freedom of movement. In other words, the habit of the muscles controlling mandibular movement had not yet become sufficiently estalished to hold the mandible permanently forward.

The labial segment in the upper was moved slowly forward over a period of six months until a reasonably stable incisor relationship was reached. This was done by opening the screw one turn each week, and the temporary upper incisors and canine teeth and the bone supporting these teeth were moved forward between 4 and 5 mm.

It was then found to be necessary to expand the upper arches laterally for a short length of time, because although the anteroposterior relationship was much improved, it appeared that the temporary lower canines and first molars could not quite bite inside their opponents in the maxilla.

Although the treatment had been identical for each child, "E" and "M" were in a better relationship than "P" and "F".

It was decided now to await the eruption of the permanent central teeth in the upper and lower jaws.

Everything appeared to be proceeding normally, with the new teeth erupting, when the children became ill at this time of crisis in my treatment plan.

The mother came to tell me that in the case of "E" and "M", who were a little earlier with their new teeth, the upper central teeth had erupted anterior to the lower central teeth and all was well, but with "P" and "F" it looked as if the upper central incisors were going to erupt inside the lowers, and she wanted my advice.

While they were recovering from their illness, they were seen again, and it was found that the mother's assessment had been absolutely correct, but it was thought wiser not to contemplate making new appliances until the children were completely fit.

Wooden spatulas were therefore to be used after each meal, and for a period of five minutes on each occasion. The spatula was placed under the upper central teeth and pressure applied to the inner surface with the lower incisor teeth. The correct relationship was achieved in a very short space of time.

An upper incisor overlap and overjet had been obtained in the permanent dentition some 15 months after active treatment had been instituted and completed in the temporary dentition (*Figs.* 4, 5).

It is now reasonable to assume that the prenormality of the mandible will not recur, although a regular watch will be kept upon these children, until they have completed their growth.

The loss of space as a result of the premature extraction of the second temporary lower molars was very small indeed, and this is a noticeable factor in many cases of Angle's Class III abnormalities, when sometimes the space may even open.

It may be necessary at a later stage to remove a premolar tooth symmetrically in the particular case, and what has taken place naturally.

Models tell him a certain amount, but not nearly so much as superimposed tracings of cephalometric lateral skull radiographs (*Fig.* 6).

These tracings of the quadruplets are superimposed on a Registration point, R. The Bolton plane must first be drawn. This is from

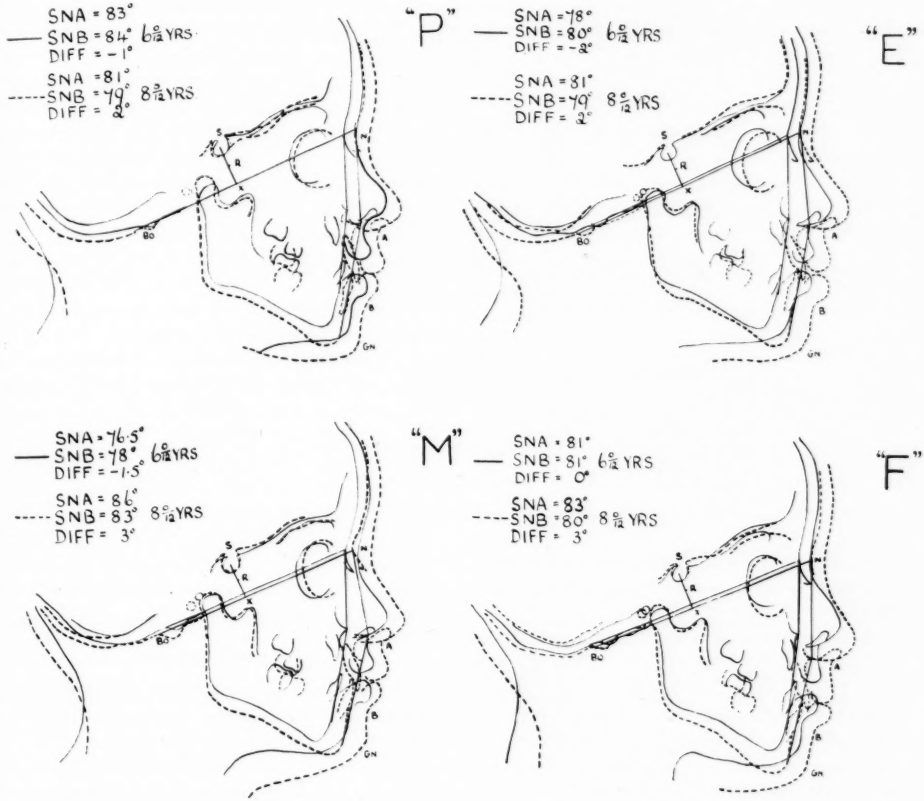

Fig. 6.—Superimposed tracings of lateral skull radiographs of all the "quads" before and after treatment.

lower jaw in view of the original Class III relationship, and also to obviate the risk of impacted mandibular third molars, but this is by no means certain at the present time.

A great deal may be learned in the orthodontic field if the practitioner will look back and try to assess what he has achieved in any

Bolton point, BO, to Nasion, N. A perpendicular is then dropped from Sella Turcica to the Bolton plane, and R is the centre point of this perpendicular line.

In this two-year growth period under consideration (*Table I*) it is interesting to note that the three children who presented a prenormal

mandibular relationship in a centric position have all grown by amounts which are almost identical as far as measurements of the skull are concerned. The child "M", who had a crossed bite, is somewhat smaller in each measurement made.

The angle of the upper incisor to the Frankfort plane has been increased in the three children "E", "P", and "F" by 9° or 10°, but it is most interesting to note that the angle of the lower incisor to the mandibular plane with no forces exerted upon it has been

Table I.—Measurements of Facial Growth in Three Directions during the Period under Discussion

	Distance R to Incisal Edge 1|	Difference	Distance N–GN	Difference	Distance X–N	Difference
	mm. mm.	mm.	mm. mm.	mm.	mm. mm.	mm.
"M"	69 89	20	103 110	7	59 63	4
"E"	71 93	22	104 116	12	63 70	7
"P"	72 94	22	104 116	12	63 70	7
"F"	71 93	22	103 115	12	63 70	7

Table II.—Changes in the Facial Profile and Incisor Tooth Angulation which occurred as the Result of Treatment

	Angle of Facial Profile		Difference	Angle of Upper Incisor to Frankfort Plane		Difference	Angle of Lower Incisor to Mandibular Plane		Difference
"M"	168°	159°	−9°	104°	107°	3°	93°	86°	− 7°
"E"	170°	162°	−8°	101°	110°	9°	92°	80°	−12°
"P"	172°	164°	−8°	100°	109°	9°	88°	76°	−12°
"F"	174°	166°	−8°	100°	110°	10°	87°	76°	−11°

In each case, the first measurement is before treatment and the second measurement after treatment.

The growth in the total face height, Nasion to Gnathion, N–GN, in "E", "P", and "F" was 12 mm., while in "M" it was only 7 mm.

The forward growth of the superior face from point X to Nasion, X–N, had increased by 7 mm. in the three children, and only 4 mm. in "M".

As a result of treatment, the differences between the angles S N A and S N B before and afterwards are significant (*Fig.* 6), and this is borne out by the reduction in the angle of facial profile or facial convexity (*Table II*).

In this case the angle is made at the anterior nasal spine by intersecting lines drawn from nasion and from the most anterior point of the mandible in the midline.

reduced by 11° or 12° to some 76–80°, which appears to be an acceptable position both functionally and aesthetically.

CONCLUSIONS

It has been my experience to watch many Class III abnormalities arising in the temporary dentition of very small children.

My work in a Children's Hospital where the patients are normally seen from birth to 12 years of age may seem, to the established orthodontist, a rather unusual approach to a subject which many consider to be better left until a child is much older.

However, a great deal may be learned from these very small children, particularly with regard to the development of abnormalities which the average orthodontist never sees.

A careful watch has been kept to discover any Class III relationship which may be present before the temporary canine teeth erupt, and not one case has been found in the period of the last eight years. In the same period, however, 75 cases of Class III deformity have been treated in the temporary dentition with very successful results. Once an incisor overlap has been observed in the permanent dentition, no further prenormality of the lower jaw has developed.

This leads me to believe that many of our Class III abnormalities arise in the temporary dentition at the age of 18 months to 2 years owing to the faulty interdigitation of the cusps of the temporary canine teeth. Because of this assumed faulty relationship, the mandibular bone develops at a far greater rate than is normal, and the growth centres in the maxilla are inhibited purely because of the position of the teeth in the upper jaw.

This abnormal bone development continues until adult life, with many of the fearful results which we see and which, in the end, can only be treated by surgical procedures, the most popular of which is the Kostekka operation.

How easy it is, therefore, to deal with these minor abnormalities at an early age, and to save the patient lengthy and complicated treatment in adolescence, at a time when schooling and examinations may play havoc with the best laid treatment plans.

I am indebted to Mr. Arthur Bell for permission to show some of his photographs of this case, and to Mr. Frank Denny for his help in providing details of the early life of these children.

To Chief Superintendent Livings, of Scotland Yard, for the preparation of the palm prints.

To Dr. Sidney Blackman for the preparation of the lateral skull radiographs, and to Dr. Hansell and his staff of the Department of Medical Photography at the Westminster Hospital for the excellent photographs which they have produced for me.

REFERENCE

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DISCUSSION

The President thanked the author for a valuable and interesting presentation. They had been enthralled by his observations. It was probably the ambition of every one of them at some time to "collect" twins or triplets or quadruplets. It was a little surprising to hear the word "hypertelorism" used and he would not have thought it applicable. Then, reference was made to a "pendulous lower lip". Mr. Broadway had shown them such a fine example the previous day, but he would not have used that description in any of the quadruplets, judging by the photographs.

Mr. W. J. Tulley congratulated Mr. Ritchie on a most meticulous paper, particularly with regard to the detail of the genetic factors. He had a great regard for Mr. Ritchie's work. He had recently been in charge of a set of quadruplets himself, two of whom were uniovular while the other two were quite dissimilar.

An intriguing aspect of these quadruplets was the differences that had been pointed out. It might be said that the differences were minor ones, but there nevertheless was a difference, particularly in one of the four. Nor could they ignore the mother's attitude about her having two pairs of twins. The hæmatological reports were all adamant that the children were all from one ovum and had the same basic genetic pattern. Did this indicate influences in intra-uterine environment? In multiple births all the children had a similar environment fundamentally, but with four fœtuses being supplied by the maternal circulation there might be minor differences which could account for differences in development.

The author seemed to stress occlusal interference and its effect on growth. He had said that the upper jaw was not developing as rapidly and the lower jaw was developing more rapidly entirely owing to occlusion. Mr. Tulley could not disagree more about that.

One might wish the author had left at least two of the quadruplets alone. It would now never be known how they would have developed had they not been treated in the early stage. The ideal time for treating pseudo-Class III cases was when the permanent incisor erupted. With all respect, the author might have been wasting his time. It was an intriguing suggestion that growth had been enabled to occur more normally. Certainly the alveolar process was influenced, but the effect on mandibular growth was open to question.

The author had said that the lower spaces created by extraction were not closing, which was natural in skeletal III cases, and went on to say that he was contemplating the extraction of two lower premolars. There must be others who would want to ask searching questions. The author had studied the genetic background and that was the key. They wanted to know more about intra-uterine differences with the same basic genetic set-up.

Mr. Ritchie, replying to the President, said he had recently been dealing with a lot of cleft palate children and perhaps hypertelorism was something one looked for rather too closely. The orbit width in these particular

children was very marked, certainly at the early age, but as they were developing it was tending to become less. As for the reference to pendulous lips, the children were quite ugly when first seen. They stuck out their lower lips and chins. Perhaps the photographs shown portrayed them on their best behaviour. However, it was something that should be mentioned in passing in view of the relationship.

Mr. Tulley's remarks were always interesting as a result of his wide experience. Occlusal interference might have been stressed rather too forcibly, but in dealing with very small children one felt as if there were in one's hands such small organisms full of dynamic growth potential, and to see a small child developing was something intriguing. The tissues were so soft and malleable that one experienced a sense of enormous possibilities. Anything put in the way of normal growth could be most disturbing. The question of the extraction of the lower premolars was just a passing fancy and certainly not something rooted in his mind. It was something being thought about for the future.

Mr. G. C. Dickson thanked Mr. Ritchie for a fascinating paper. He had said that the growth centres in the maxilla were inhibited. Just how did he think the maxilla grew?

Mr. Ritchie said the question was difficult. They all knew that the maxilla grew in a forward and downward direction. If there was put in the way of that growth hard tooth tissue, then there probably occurred the same sort of thing which occurred in the cleft palate patient as a result of the interference of surgery. Certainly very early surgical intervention would stop the maxilla from growing normally. Recently he had seen some pictures of twenty-one Mexicans, all adults, who had cleft palates which had never been touched. They had teeth erupting in all sorts of directions, but maxillary growth had occurred quite normally. Anything which was put in the way of normal growth was a disturbing factor.

Mr. A. J. Walpole Day thanked Mr. Ritchie for an enlightening and amusing paper and said he wanted to put four brief questions. Were any of the children left-handed? Had Mr. Tulley's suggestion of not treating two of them been considered? Had Mr. Ritchie considered grinding down the cusps of the temporary canine teeth? Had the children had their tonsils or adenoids taken out or any other surgical interference? As regards the tracing of quadruplet "M", the orbit, instead of descending about 2 mm., actually appeared to have gone up about 2 mm. Was the orientation of the X-ray quite accurate?

Mr. Ritchie said that all the children were right-handed. It would not have been fair to have treated two of the quadruplets and left the other two untreated. The family were so united that it would have been a shame to have done so. There had not been a tremendous amount of success in cutting down the teeth. It produced an edge-to-edge bite, but nothing better than that. It was often necessary to cut quite a lot off the teeth and it did not serve a very useful purpose. The children had undergone no surgery of any kind. With regard to the orbit tracing the point had not been noticed, but he would check up on it.

Mr. H. E. Wilson said that had he been given Mr. Ritchie's glorious opportunity he would have done the same thing. It was easy to criticize other people's work. There were aspects of growth and development which cephalometrics could not explain. It was a wonderful method of appraisal and one learnt a lot from it, but it was not 100 per cent successful.

The children "M" and "E" were very similar but they were not alike in facial measurements. It should be remembered that two children might be quite different although they were twins. One should not read too much into comparisons in growth or treatments. Mr. Ritchie's valuable material might have included some ciné record of the soft-tissue behaviour.

Mr. Ritchie said he agreed that there were considerable differences between the quadruplets "M" and "E". The differences were interesting to observe. One would probably expect to find the children more similar than they actually were. Further investigation would probably reveal many other differences, but there were enough in the head and the teeth only. He hoped in the future to take advantage of the suggestion to make a cinematograph film of soft-tissue behaviour.

Mr. Tulley said it was the last paragraph of the paper which had really roused him. It suggested that by early treatment one would prevent some of the major Class III jaw relationships and obviate the necessity for operations. That was the one point with which he really disagreed.

The President said the discussion had been an extremely interesting one, which again, could have continued for a long time. He thanked Mr. Ritchie for his careful and valuable presentation.

A Longitudinal Study of Soft Tissue Facial Structures and their Profile Characteristics, Defined in relation to Underlying Skeletal Structures

Radiographic records on 30 subjects from 3 months to 18 years were studied. There were no cases of abnormal protrusion or retrusion.

The convexity of the skeletal profile tended to decrease with age, while the convexity of the total soft-tissue profile tended to increase. If the nasal structures were excluded from the soft-tissue profile, the latter tended to remain relatively stable. Thus the thickness of the soft tissue over the middle half of the face increased proportionately more than the soft tissue over the lower face.

The tissue in the lower facial region did reflect modifications in the underlying skeleton and dentition. With the increment in mandibular prognathism there was recession of the upper dentition in relation to the profile. The anterior teeth were observed to fall back relative to the facial plane.—SUBTELNY, J. D. (1959), *Amer. J. Orthodont.*, **45**, 481.